



SERVICE MANUAL

TR-7950/TR-7930 TU-79

2m FM TRANSCEIVER



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TR-7950/TR-7930

SPECIFICATIONS

[General]

Semiconductors.....	MPU	1
	ICs	19
	Transistors	43
	FETs	5
	Diodes	61 (K) (M), 60(T), 59(w)
Frequency range.....	144.000 to 147.995 MHz (K) (M)	
	144.000 to 145.995 MHz (W) (T)	
Frequency synthesizer.....	Digital control, phase locked VCO	
Mode.....	FM (F3)	
Antenna impedance.....	50 ohms	
Power requirement.....	13.8V DC \pm 15%	
Grounding.....	Negative	
Operating temperature.....	-20°C to +50°C	
Current drain.....	0.5A in receive mode with no input signal	
	(TR-7950) (Max.) 9.5A in HI transmit mode	
	(TR-7930) (Max.) 6.5A in HI transmit mode	
	(TR-7950) (Approx.) 3.0A in LOW transmit mode	
	(TR-7930) (Approx.) 2.5A in LOW transmit mode	
Dimensions.....	175 mm (6 - 7/8) wide	
	64 mm (2 - 1/2) high	
	220 mm (8 - 11/36") deep	
	(TR-7950),	
	206 mm (8 - 1/16") deep	
	(TR-7930)	
	(projections excluded)	
Weight.....	1.9 kg (4.18 lb) (TR-7950)	
	1.8 kg (3.96 lb) (TR-7930)	

[Transmitter Section]

RF output power	
(at 13.8V DC, 50 Ω load)....	HI 45 Watts min. (TR-7950)
	25 Watts min. (TR-7930)
	LOW 3 ~ 7W (TR-7950)
	2 ~ 6W (TR-7930)

Modulation.....	Phase shift
Frequency tolerance	
(-20°C ~ +50°C).....	Less than $\pm 15 \times 10^{-6}$
Spurious radiation.....	HI Less than -70 dB
	LOW Less than -60 dB
Maximum frequency	
deviation (FM).....	± 5 kHz
Microphone.....	Dynamic microphone with PTT switch, 500 Ω

[Receiver Section]

Circuitry.....	Double superheterodyne
Intermediate frequency ...	1st 1F 10.695 MHz
	2nd 1F 455 kHz
Receiver sensitivity.....	Better than 30 dB for 0.5 μ V S+N/N
	Better than 12 dB for 0.25 μ V SINAD
Receiver selectivity.....	More than 12 kHz (-6 dB)
	Less than 24 kHz (-60 dB)
Spurious response.....	Better than 70 dB
Squelch sensitivity.....	Less than 0.16 μ V (threshold)
Auto scan step level.....	Less than 0.2 μ V (threshold)
Audio output.....	More than 2.0 watts across 8 ohms load (5% dist.)

Note: Circuit and ratings are subject to change without notice due to developments in technology.

SEMI CONDUCTOR

K₁, M₁, T₁, W₁ : TR-7950 (45W Type)

K₂, M₂, T₂, W₂ : TR-7930 (25W Type)

N : New Parts

Item	Name	Re- marks
Diode	1N60	
	1S1555	
	1S1587	
	1S2208	
	1SV50	
	MI402	K ₁ , M ₁ , T ₁ , W ₁
	MI303	K ₂ , M ₂ , T ₂ , W ₂
	U15B	
	UM9401	
	Zener Diode	WZ-120
XZ-043		
XZ-055		K, M
XZ-060		T, W
Thermistor	112-102-2	
LCD	FTS1212	N
LED	GL107S12	N
	GL9HY24	N
	PY5532K	
	SLP144B	
TR	2SA496 (Y)	

Item	Name	Re- marks
FET	2SA1015 (Y)	
	2SA1048 (Y)	
	2SC496 (Y)	
	2SC945 (Q)	
	2SC1675 (L)	
	2SC1775 (E)	
	2SC1815 (Y)	
	2SC1815 (BL)	
	2SC1959 (Y)	
	2SC2240 (GR)	
	2SC2347	
	2SC2458 (Y)	
	2SC2458 (BL)	
	2SC2538-22-A	
		K ₂ , M ₂ , T ₂ , W ₂
	2SC2603 (D, E)	
	2SC2668 (Y)	
	2SC2787 (L)	
	2SC3019	K ₁ , M ₁ , T ₁ , W ₁
	2SD880 (Y)	
	2SK125	
	3SK73 (GR)	

Item	Name	Re- marks
IC	3SK74 (L)	
	AFG05F1750A2	T, W
	LR4087	K, M
	MB3712	
	MC14066BCP	
	MC145155P	
	MC145151P	
	NJM78L06K	
	MK5087N	K, M
	MSM58292GS	
	TA7302P	
	TA7612AP	
	TC4011BP	
	TC4049BP	
	TC4050BP	
	UPC577H	
	UPC592H2	
UPC78M08H		
UPC4558C		
Micro-processor	UPD7508C-017	N
Power Module	M57726	K ₁ , M ₁ , T ₁ , W ₁
	M57737	K ₂ , M ₂ , T ₂ , W ₂

CIRCUIT DESCRIPTION

The TR-7950 and TR-7930 are 2 meter high power FM amateur radio mobile transceivers.

The operating frequency is controlled in 5 kHz steps by a microcomputer-controlled PLL (Phase Locked Loop). An LCD (Liquid Crystal Display) indicates various information. Both models have 21 memory channels for storing operating frequencies. Operation is controlled by either the keyboard or memory channel selector. The keyboard is illuminated for night time operation. The memory channel knob perimeter lights memory channel recall operations. Repeater functions include programmable offset, manual offset select, reverse and two paired-channel memories. Types K and M can be equipped with an optional plug-in subtone circuit which allows 3 preset tone signals to be stored and controlled from memory; these types also have a built-in touch tone encoder. Types T and W include a 1750 Hz tone burst circuit. The microcomputer (backed up by a built-in lithium battery) supports all control functions such as scanning and Up/Down tuning. These transceivers are also equipped with a "beep" tone generator and other accessory circuits.

[RX]

The antenna signal is fed to the RX unit from the diode T/R switch in the Final unit. The RX unit front end consists of a dual gate FET RF amplifier Q1: 3SK74, first mixer Q2, a helical resonator and a 2-stage MCF (Monolithic Crystal Filter). This front end has high dynamic range and sensitivity.

The 10.695 MHz 1st IF signal from the MCF is mixed with the 10.24 MHz 2nd local signal by the 2nd mixer, Q3: 3SK73 and converted to a 455 kHz signal. This 455 kHz signal is applied through ceramic filter CF1 (CFW-455F) to the IF amplifiers Q6: TA7302P, Q7: 2SC2787, and Q8: μ PC577H. The amplified and limited signal is detected by ceramic discriminator L11. The 10.24 MHz 2nd local oscillator signal is also sent to the PLL unit for use as the reference signal.

The receiver detector output consists of three components: voice intelligence, noise and direct current.

The voice component, after de-emphasis, is preamplified by Q16: 2SC2240, and is then power amplified by Q17: MB3712 to drive the speaker.

The noise component is applied to a band pass filter to obtain noise at about 30 kHz. This filtered noise component is applied to noise amplifier Q11: μ PC592H2, which provides the squelch operating signal. After detection by diodes D7 & D8, the signal is DC amplified by Q12 and Q13 for control of the AF preamplifier, Q16.

The direct current component is applied to window comparator Q9: μ PC4558 which checks whether the signal being received is in the center of the receiver's pass band. An on-channel signal will be detected at or near zero DC volts, while a signal greater than ± 2 kHz from channel-center will contain a polar DC component sufficient for comparator rejection. Both the comparator and squelch output signals are applied to a logic AND operation (Q14), and the C-TUNE indicator is lit when the resultant is true. The AND output is also sent to the Control unit as the scan stop (SS) signal.

Item	Rating
Nominal center frequency (f_0)	10.695 MHz
Pass bandwidth	± 7.5 kHz or more at 3 dB
Attenuation bandwidth	± 25 kHz or less at 40 dB ± 45 kHz or less at 60 dB
Guaranteed attenuation	1. 70 dB or more within ± 1 MHz 2. Spurious level = 40 dB or more at $f_0 \sim f_0 \pm 500$ kHz 3. Spurious level = 80 dB or more at $f_0 - (910 \text{ kHz} \pm 10 \text{ kHz})$
Ripple Loss	1.0 dB or less 1.5 dB or less
Impedance	3 k Ω /0 pF

Table 1. MCF (L71 - 0216 - 05) RX unit XF 1

Item	Rating
Nominal center frequency	455 kHz
6 dB bandwidth	± 6 kHz or more
50 dB bandwidth	± 12.5 kHz or more
Ripple (within 455 ± 5 kHz)	3 dB or less
Loss	6 dB or less
Guaranteed attenuation (within 455 ± 100 kHz)	35 dB or more
Input and output impedance	2.0 k Ω

Table 2. Ceramic filter (L72 - 0315 - 05) RX unit CF 1

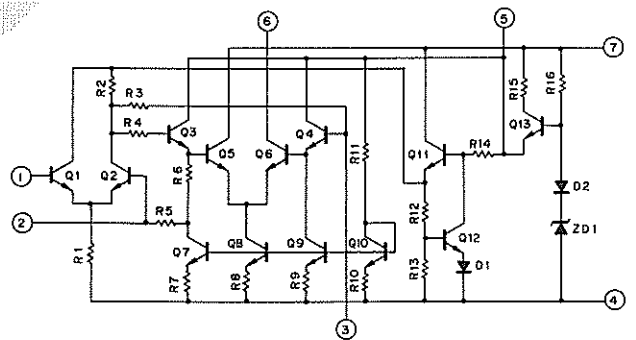


Fig 1. TA7302P Equivalent circuit RX unit Q6)

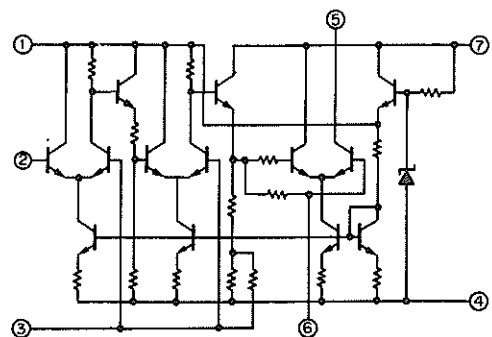


Fig 2. μ PC577H Equivalent circuit (RX unit Q8)

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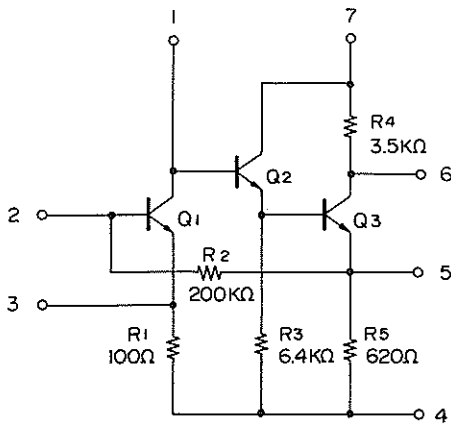


Fig 3. μ PC592H2 Equivalent circuit (RX unit Q11)

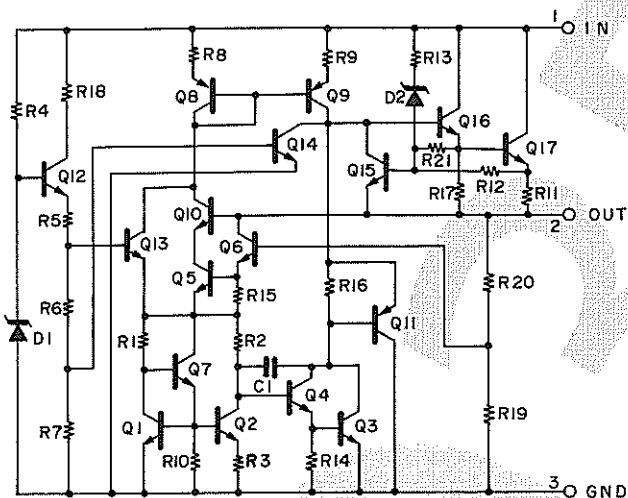


Fig 4. μ PC78M08H Equivalent circuit (RX unit Q21)

[TX]

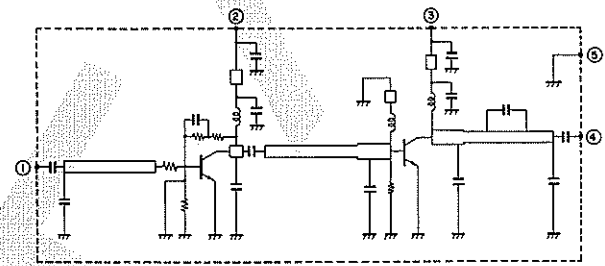
Audio from the microphone is amplified by Q18: μ PC4558C (in the RX unit), buffered by Q19: 2SC2458(Y) and limited by diodes D13 ~ D16 (1S1555's). High frequencies which may be included in the limited signal are eliminated by active low pass filter Q20: μ PC4558C. The filtered signal is applied to the TX-PLL loop (in the PLL unit) via the MO line to phase modulate the RF signal. The resultant FM signal is amplified by Q22: 2SC2668(Y), Q23: 2SC2347 and Q24: (2SC3019 for the 45W type and 2SC2538 for the 25W type) to drive the Final unit.

The DO input to the Final unit is power amplified by power hybrid Q1: (M57726 for the 45W type and M57737 for the 25W type), then fed to the antenna through the T/R switch (D1 and D2) and low pass filter.

The APC (Automatic Power Control) circuit switches the output power between high and low to protect the final unit as follows. The output from the power hybrid is detected by diode D3, and the detected signal is amplified by Q7: 2SC2458(Y), which is controlled by the Hi/Low switch setting. Q7's output is applied to differential amplifier Q4 and Q5: 2SC2458(Y)'s. The reflected power from the antenna is detected by diode D4, amplified by Q6: 2SC2458(Y), and also applied to the differential amplifier. The differential amplifier's output is applied to regulators Q3: 2SA496(Y) and Q2: 2SD880(Y) and to the collector of Q24 in the PLL unit to control transmitter output by reducing the voltage applied to Q1 pin 2 (DB).

Item	Symbol	Tc (°C)	Condition	Rating
Operating	Vcc	25		17V
DC current	Icc	25		7A
Operating case temp.	Tc (op)		-30 ~ +110°C	
Storage temp.	Tstg		-40 ~ +110°C	
Power input	Pin	25	Zg=Zl=50Ω	0.4W
Power output	Po	25	Zg=Zl=50Ω	40W

Table 3. Max rating M57737 (TR-7930)



① INPUT ② VCC1 ③ VCC2 ④ OUT ⑤ GND

Fig 5. M57737 Equivalent circuit (TR-7930)

MAX Rating M57726

Item	Symbol	Tc (°C)	Rating
Operating voltage	Vcc	25	17V
DC current	Icc	25	14A
Operating case temp	Tc (op)		-30 ~ +110°C
Storage temp	Tstg		-40 ~ +110°C

Electrical characteristic M57726

Item	Symbol	Tc (°C)	Condition	Value	
				Min.	Typ
Power output	Po	25	Vcc = 12.5V, F = 144 ~ 148 MHz Pin = 0.4W, Zl = Zg = 50Ω	43W	47W
Total efficiency	η_T	25	Vcc = 12.5V, F = 144 ~ 148 MHz Pin = 0.4W, Zl = Zg = 50Ω	50%	54%

Table 4. M57726 (TR-7950)

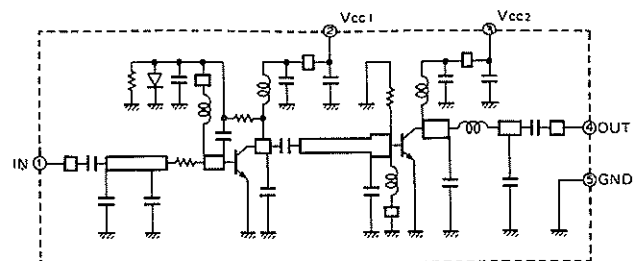


Fig 6. M57726 Equivalent circuit (TR-7950)

TR-7950/TR-7930

[Control Unit (X53-1180-10)]

An LCD (Liquid Crystal Display) indicates both the operating frequency in four digits and the memory channel in one of two digits. This LCD is statically driven.

(1) LCD data output

Q4, The microcomputer, sends serial data for the LCD to Q101: MSM58292GS in the LCD unit through three data lines.

(2) PLL data output

The microcomputer also sends division serial data for PLL operation to Q5 in the PLL unit through three data lines. Two of these data lines, SERIAL DATA and CLOCK, are also used as LCD data lines.

(3) Keyboard

The keyboard switches are scanned by the microcomputer; pulse signals are output from ports P30 ~ P33 and the return pulses are received at ports P10 ~ P13. During transmission, receive ports P10 ~ P13 are disconnected via bilateral switch Q6: MC14066BCP. This allows keyboard control of Q8: LR4087, the DTMF (Dual Tone Multi-Frequency) generator during transmission without disturbing frequency setting. The return pulse signals are shaped by Q5: TC4050BP before being fed back to the microcomputer.

(4) Switches (Switch unit)

Switches are scanned by the microcomputer; scan pulse signals are output from ports P22 and P23 and the return pulses are received at ports P10 ~ P12.

(5) Rotary Encoder (M. CH)

The rotary encoder signals are applied via the E1 & E2 lines to Q3: TC4049BP, then Q5: TC4050BP. These ICs shape the signal waveform to reduce chattering, etc. These are input to microcomputer ports P72 and P73 for processing.

(6) Up/Down

The Up/Down signals from the microphone are inverted by Q3: TC4049BP, then applied to microcomputer ports P70 and P71.

(7) Scan

The squelch stop signal from the RX unit is applied to microcomputer port P61. This signal is also applied to R12 and C9, the delay circuit which determines the scan hold time. This is inverted by Q3: TC4049BP and applied to microcomputer port P62. One-half of Q7: TC4011BP is a monostable vibrator used to adjust (with VR1) scan resume timing. The trigger pulse for the vibrator is output from microcomputer port P53.

(8) "Beep" tone generator

The "beep" tone is generated by an astable vibrator, the other one half of Q7: TC4011BP. The switching signal for the vibrator is output from microcomputer port P20. Tone frequency is determined by R28 and C24.

(9) Backup circuit

The voltage output from Q1, the AVR (Automatic Voltage Regulator) is applied to microcomputer switching input port P00 through Q2: 2SA1048(Y). When the AVR output voltage drops to the lithium backup battery voltage, the level at P00 goes L to start backup and stop the clock signal.

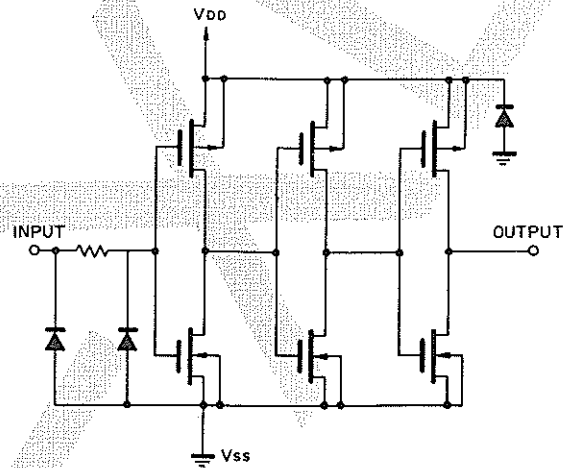


Fig. 9. TC4049BP Equivalent Circuit 1/6 (Control Unit Q3)

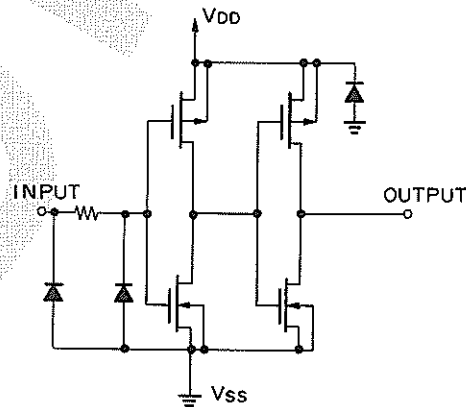


Fig. 10. TC4050BP Equivalent Circuit 1/6 (Control Unit Q5)

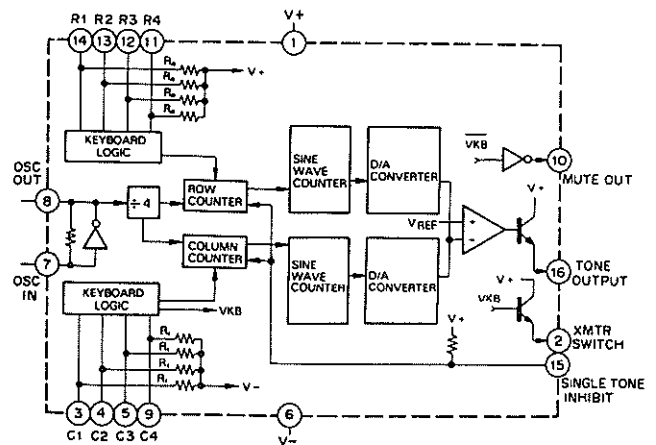


Fig. 11. MK5087N, LR4087 (Control Unit Q8) K only

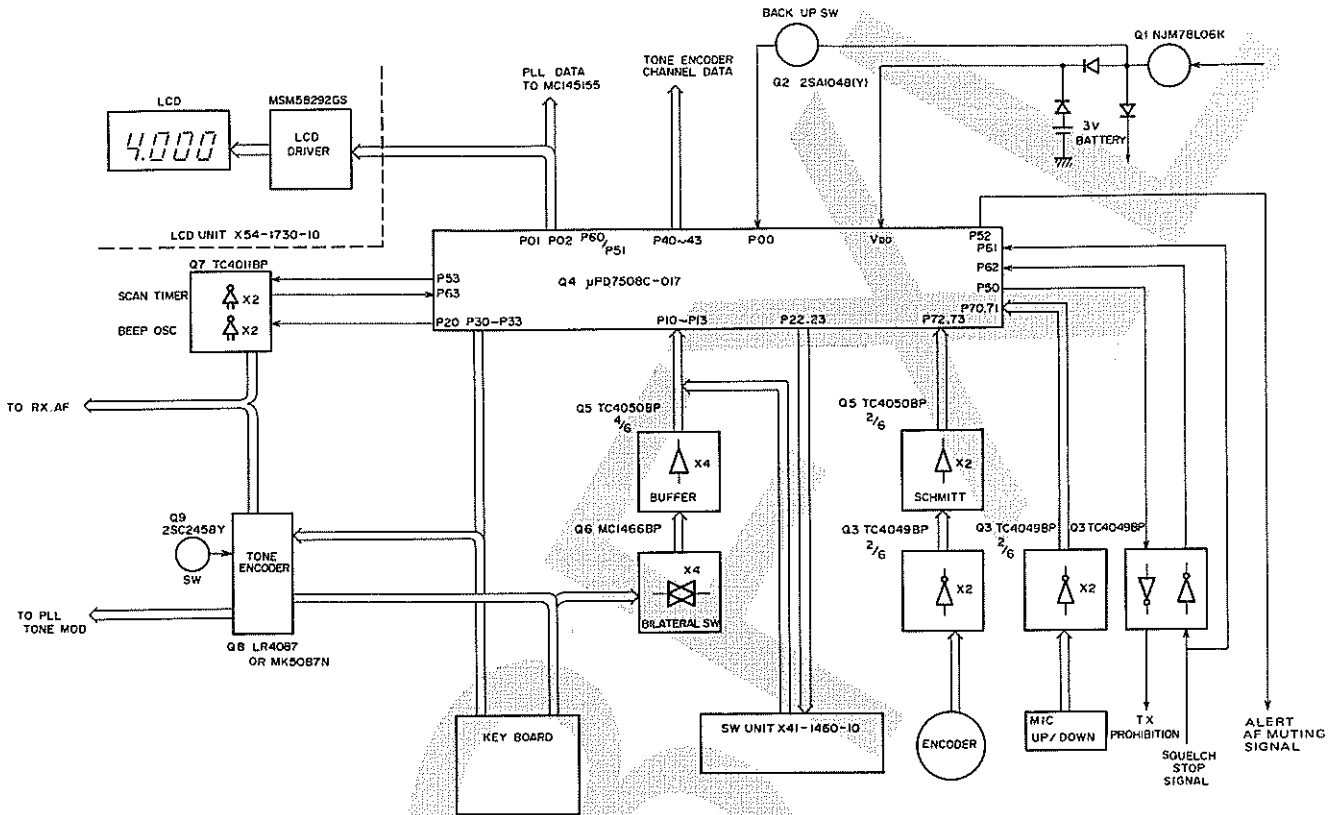


Fig 12. Control Unit Block Diagram

TERMINAL FUNCTION OF μPD 7508C-017

Terminal No.	Symbol	Function	Input	Output
1	X2	Open		
2	P20/PSTB	"Beeper" switching		○
3	P21/PTOUT	SCAN pulse		○
4	P22	SW SCAN pulse		○
5	P23	SW SCAN pulse		○
6	P10	KEY return and SW return (KA)	○	
7	P11	KEY return and SW return (KB)	○	
8	P12	KEY return and SW return (KC)	○	
9	P13	KEY return and SW return (KD)	○	
10	P30	KEY scan (K0)		○
11	P31	KEY scan (K1)		○
12	P32	KEY scan (K2)		○
13	P33	KEY scan (K3)		○
14	P70	MIC up SW input	○	
15	P71	MIC down SW input	○	
16	P72	Encoder E2	○	
17	P73	Encoder E1	○	
18	RESET	Reset input	○	
19	CL1	Clock		
20	VDD	Power supply		

Terminal No.	Symbol	Function	Input	Output
21	CL2	Clock		
22	INT 1	GND		
23	P00/INT 0	Back up information input	○	
24	P01/SCK	PLL Display serial data		○
25	P02/SO	PLL Display		○
26	P03/SI	TX/RX input RX: H, TX: L	○	
27	P60	LCD Driver Load of MSM58292GS		○
28	P61	SCAN stop signal	○	
29	P62	SCAN stop delay signal	○	
30	P63	SCAN timer input signal	○	
31	P50	TX inhibit signal		○
32	P51	PLL MC145155 Load signal		○
33	P52	ALERT audio mute signal		○
34	P53	SCAN Timer trigger pulse		○
35	P40	TONE ON/OFF data		○
36	P41	TONE channel data F1		○
37	P42	TONE channel data F2		○
38	P43	TONE channel data F3		○
39	VSS	GND		
40	X1	GND		

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PARTS LIST

CAPACITORS

$\frac{CC}{1} \frac{45}{2} \frac{TH}{3} \frac{1H}{4} \frac{220}{5} \frac{J}{6}$
 1 = Type ceramic, electrolytic, etc
 2 = Shape round, square, etc
 3 = Temp coefficient
 4 = Voltage rating
 5 = Value
 6 = Tolerance

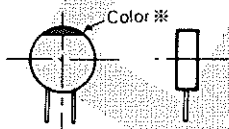
Temperature coefficient

1st Word	C	L	P	R	S	T	U
Color	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750

2nd Word	G	H	J	K	L
ppm/°C	±30	±60	±120	±250	±500

Example CC45TH = -470 ± 60ppm/°C

CC45



Rating voltage

2nd word / 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	-
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	-
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	-

Capacitor value

0 1 0 = 1pF
 1 0 0 = 10pF
 1 0 1 = 100pF
 1 0 2 = 1000pF = 0.001μF

1 0 3 = 0.01μF

$\frac{2}{1st\ number} \frac{2}{2nd\ number} 0 = 22pF$
 Multiplier

Tolerance

Cord	C	D	G	J	K	M	X	Z	P	No cord
(%)	±0.25	±0.5	±2	±5	±10	±20	+40	+80	+100	More than 10μF - 10 ~ +50 Less than 4.7μF - 10 ~ +75

Less than 10 pF

Cord	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

Resistors not listed in this parts list are standard, fixed carbon composition, 1/4W or 1/8W. The resistance values, in ohms, are indicated on the schematic diagram.

Abbreviation		Abbreviation	
Cap	Capacitor	ML	Mylar
C	Ceramic	S	Styren
E	Electrolytic	T	Tantalum
MC	Mica		

N: New parts

TR-7950: K₁,M₁,T₁,W₁
 TR-7930: K₂,M₂,T₂,W₂
 K = K₁,K₂ M = M₁,M₂
 T = T₁,T₂ W = W₁,W₂

Symbol	Destination
K	U.S.A.
W	Europe
T	Britain
M	General market

Part No.	Re- marks	Description	
GENERAL			
A01-0932-03	N	Case (A)	
A01-0933-03	N	Case (B)	
A13-0612-02		Angle Assy (Right)	
A13-0613-02		Angle Assy (Left)	
A13-0614-04		Mounting hardware	
A20-2454-03	N	Panel (TR-7950)	K ₁ ,M ₁ ,T ₁ ,W ₁
A20-2455-03	N	Panel (TR-7930)	K ₂ ,M ₂ ,T ₂ ,W ₂
B05-0701-04		Speaker grill cloth	
B05-0713-04		Grill cloth	
B40-2620-04	N	Name plate	K ₁ ,M ₁
B40-2621-04	N	Name plate	T ₁
B40-2622-04	N	Name plate	W ₁

Part No.	Re- marks	Description	
B40-2623-04	N	Name plate	K ₂ ,M ₂
B40-2624-04	N	Name plate	T ₂
B40-2625-04	N	Name plate	W ₂
B43-0680-04	N	Badge	K,M,W
B43-0681-04	N	Badge	T
B46-0058-10		Warranty card	K
B50-3993-00	N	Instruction manual	K
B50-3994-00	N	Instruction manual	T
B50-3995-00	N	Instruction manual	W
B50-4004-00	N	Instruction manual	M
E06-0651-05		6P Metal socket (MIC)	
E07-0252-05		2P Connector	
E07-0651-05		6P Metal consent	
E12-0001-15		Phone plug	

N: New Parts

TR-7950/TR-7930

PARTS LIST

Part No.	Re- marks	Description	
E30-1674-05		DC Cord assy (TR-7950)	K ₂ ,M ₂ ,T ₂ ,W ₂
E30-1685-05		DC Cord assy (TR-7930)	K ₁ ,M ₁ ,T ₁ ,W ₁
E31-0456-05		Connector with lead line (SP)	
F05-1031-05		Fuse, 10A × 2 (TR-7950)	K ₁ ,M ₁ ,T ₁ ,W ₁
F05-8021-05		Fuse, 8A × 2 (TR-7930)	K ₂ ,M ₂ ,T ₂ ,W ₂
G02-0505-05		Knob fixed spring, (VOL)	
G09-0411-05		Knob fixed spring, (SQL)	
G53-0511-04		Packing, (Case) × 8	
H01-4437-03	N	Packing carton	K ₁ ,M ₁ ,W ₁
H01-4438-03	N	Packing carton	T ₁
H01-4439-03	N	Packing carton	K ₂ ,M ₂ ,W ₂
H01-4440-03	N	Packing carton	T ₂
H10-2501-03		Packing fixture	
H25-0049-03		Accessory bag	
H25-0079-04		Protective bag, MIC	
H25-0103-04		Protective bag, Cord	
H25-0106-04		Protective bag, TR-7950/30	
J02-0069-05		Rubber foot × 2 (Accessory)	
J02-0070-05		Foot × 2 (Accessory)	
J21-2504-04		SP mounting hardware	
J61-0401-05		Nylon band × 3	
K21-0767-03	N	Main knob, M. CH	
K23-0735-04		Knob, SQL	
K23-0754-04	N	Knob, VOL	
K27-0435-04	N	Push knob × 6	
N09-0008-04		Ornamental screw × 4 (Accessory)	
N09-0256-05		Gnd screw, MIC	
N14-0510-04		Flang nut × 4 (Accessory)	
M15-1040-46		Washer × 4 (Accessory)	
N15-1060-46		Washer × 4 (Accessory)	
N16-0060-46		Spring washer × 4 (Accessory)	
N30-2006-46		Round head screw, ON AIR PC board	
N30-3006-41		Round head screw × 2 (Accessory foot)	
N30-3008-41		Round head screw × 2 (Accessory foot)	
N32-3006-46		Flat head screw × 8, Sub panel-Heat sink	
N33-3006-45		Round flat head screw × 18, Case-Side escu- tation	
N35-3006-46		Bind screw × 4, Panel	
N87-2606-46		Self tapping screw × 4, SW unit	
N87-3006-46		Self tapping screw × 20, PC board	
N99-0304-04		Hex. head screw × 4	
S50-1406-05		Micro switch × 2	
T03-0027-15		Speaker	
T91-0311-05		Microphone (TRIO)	T
T91-0313-05		Microphone (KENWOOD)	K,M,W
W01-0401-14		Hexagonal wrench (Accessory)	
W02-0315-05		Rotary encoder	
W09-0323-05		Lithium battery (CR2032)	
X41-1460-10	N	Switch unit	K,M
X41-1460-51	N	Switch unit	T
X41-1460-61	N	Switch unit	W
X45-1270-10	N	FINAL unit (TR-7950)	K ₁ ,M ₁ ,T ₁ ,W ₁
X45-1270-11	N	FINAL unit (TR-7930)	K ₂ ,M ₂ ,T ₂ ,W ₂
X50-1900-10	N	PLL unit (TR-7950)	K ₁ ,M ₁ ,T ₁ ,W ₁
X50-1900-11	N	PLL unit (TR-7930)	K ₂ ,M ₂ ,T ₂ ,W ₂

Part No.	Re- marks	Description	
X53-1280-10	N	Control unit	K,M
X53-1280-61	N	Control unit	T,W
X55-1330-10	N	RX unit	K,M
X55-1330-51	N	RX unit	T
X55-1330-61	N	RX unit	W
X60-1230-10	N	Display assy unit	

Part No.	Re- marks	Description	Ref. No.	Q'ty
SWITCH Unit (X41-1460-10, 61, 51) 10 : K,M 51: T 61: W				

B30-0828-05	N	Lamp with cap		1
CK45B1H102K		C, 0.001	C1	1
E40-0673-05		Connector (6P)		1
R19-9408-05	N	Pot. with SW, 10K(K), 50K(B)	S8	1
R92-0150-05		Jumper wire	K,M,W	1
S36-2410-05	N	See saw switch	S7	1
S40-2438-05	N	Push switch	K,M,W	5
S40-2438-05	N	Push switch	T	6
S40-2439-05	N	Push switch	K,M,W	1

FINAL Unit (X45-1270-10, 11) 10: TR-7950 11: TR-7930				
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CC45CH1H020C		C, 2P ±0.25P	C19,22	2
CC45CH1H330J		C, 33P	C15	1
CC45SL2H040C		C, 4P ±0.25P K ₂ ,M ₂ ,T ₂ ,W ₂	C13	1
CC45SL2H050C		C, 5P ±0.25P K ₁ ,M ₁ ,T ₁ ,W ₁	C13	1
CC45SL2H100D		C, 10P ±0.5P K ₁ ,M ₁ ,T ₁ ,W ₁	C21	1
CC45SL2H100D		C, 10P ±0.5P K ₂ ,M ₂ ,T ₂ ,W ₂	C14,21	2
CC45SL2H101J		C, 100P	C17	1
CC45SL2H120J		C, 12P K ₂ ,M ₂ ,T ₂ ,W ₂	C24	1
CC45SL2H120J		C, 12P K ₁ ,M ₁ ,T ₁ ,W ₁	C14,24	2
CC45SL2H150J		C, 15P	C16,18	2
CC45SL2H220J		C, 22P	C23	1
CC45SL2H390J		C, 39P	C20	1
CE04W1C220M		E, 22 16V	C3,5	2
CK45B1H102K		C, 0.001	C2,4,6,7,8,9 11,12,25,26 27,29,31,33	14
C90-0820-05		E, 470 16V	C1	1
C91-0105-05		C, 0.0047	C10,30	2
E04-0152-05		UHF type receptacle		1
E06-0252-05		2P Metal socket (power supply)		1
E11-0403-05		Phone jack		1
E23-0046-04		Square terminal		6
E23-0047-04		Square terminal		1
E31-2065-05		Cable with terminal (B)		1
E40-0373-05		Mini connector, 3P		1
E40-0473-05		Mini connector, 4P		1
F20-0516-05		Insulating sheet		1
F29-0014-03		Shoulder washer		1
L34-0452-05		Coil (3φ, 6T)	L4	1
L34-0692-05		VHF coil (5φ, 4T)	L3	1
L34-0742-05		Coil (3φ, 5T)	L6	1
L34-0822-05		VHF Coil (5φ, 3T)	L9	1

TR-7950/TR-7930

PARTS LIST

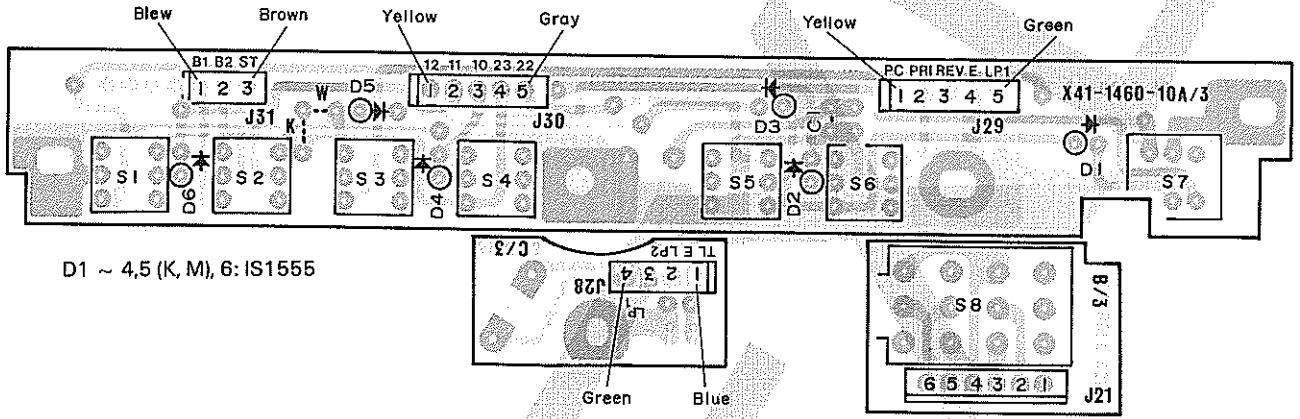
Part No.	Re- marks	Description	Ref. No.	Q'ty	Part No.	Re- marks	Description	Ref. No.	Q'ty
L34-0908-05		Coil (3φ)	L2,5	2	L32-0654-05	N	VCO coil (4 $\frac{1}{4}$ T)	L8	1
L34-1020-05		Coil (3φ, 3.5T)	L1	1	L32-0655-05	N	VCO coil (3/4T)	L14	1
L40-1091-03		Ferri-inductor (1μH)	L7,8	2	L33-0002-05		Choke coil (1μH)	L2,3	2
N09-0256-05		Gnd screw		1	L33-0605-05		Choke coil (0.47μH)	L9	1
N30-3006-46		Round Screw		1	L34-0452-05		Coil A (3φ 6T) K ₂ ,M ₂ ,T ₂ ,W ₂	L16	1
N35-3008-46		Bind screw		2	L34-0742-05		Coil A (3φ 5T) K ₂ ,M ₂ ,T ₂ ,W ₂	L17	1
N87-3006-46		Screw		5	L34-0742-05		Coil A (3φ 5T) K ₁ ,M ₁ ,T ₁ ,W ₁	L16,17	2
R12-0408-05		Trim.pot. 100Ω	VR1	1	L34-0902-05		VHF coil	L15	1
R12-3054-05		Trim.pot. 47kΩ	VR3	1	L34-2035-05		Tuning coil	L4,5	2
R12-3419-05		Trim.pot. 10kΩ	VR2	1	L40-1021-03		Ferri-inductor (1μH)	L12	1
R92-0150-05		Jumper wire		4	L40-3391-03		Ferri-inductor (3.3μH)	L6,11,13	3
RC05GF2H151J		Resister 150Ω ± 5% 1/2W K ₁ ,M ₁ ,T ₁ ,W ₁	R7	1	L77-0975-05	N	Crystal (40,0966MHz)	L1	1
RC05GF2H181J		Resister 180Ω ± 5% 1/2W K ₂ ,M ₂ ,T ₂ ,W ₂	R7	1	L77-0976-05	N	Crystal (10.695MHz)	L10	1
PLL Unit (X50-1900-10, 11) 10: TR-7950 11: TR-7930					CONTROL Unit (X53-1280-10, 61) 10: K,M 61: T,W				
C05-0030-15		Ceramic trimmer, 20P	TC1,3,5,6	4	CC45CH1H330J		C, 33P	C6	1
C05-0062-05		Ceramic trimmer, 6P	TC2	1	CE04W1A101M		E, 100 10V	C4	1
C05-0308-05		Ceramic trimmer, 4P	TC4	1	CE04W1A470M		E, 47 10V K,M	C27	1
CC45CH1H020C		C, 2P ± 0.25P	C46,69	2	CE04W1C330M		E, 33 16V	C9,15	2
CC45CH1H030C		C, 3P ± 0.25P	C1,33,35,69 68	5	CE04W1C470M		E, 47 16V	C2	1
CC45CH1H050C		C, 5P ± 0.25P	C11,12	2	CE04W1E100M		E, 10 25V	C14	1
CC45CH1HOR5C		C, 0.5P ± 0.25P	C10,62	2	CE04W1H010M		E, 1 50V K,M	C26	1
CC45CH1H080D		C, 8P ± 0.5P	C30,63	2	CK45B1H102K		C, 0.001 T,W	C3,5,10,28 29,30	6
CC45CH1H100D		C, 10P ± 0.5P	C65	1			K,MC3,5,10	19 ~ 22,28,29,30	10
CC45CH1H101J		C, 100P	C44	1	CK45B1H681K		C, 680P	C25	1
CC45CH1H120J		C, 12P	C27	1	CQ92M1H102K		ML, 0.001	C24	1
CC45CH1H150J		C, 15P	C34,61	2	CQ92M1H222K		ML, 0.0022	C23	1
CC45CH1H180J		C, 18P	C6,13	2	CS15E1A100M		T, 10 10V	C7	1
CC45CH1H220J		C, 22P	C14,47,79	3	C91-0131-05		C, 0.01	C1	1
CC45CH1H330J		C, 33P	C2,26,37,45 73	5	C91-0456-05		C, 0.047	C31,32	2
CC45SH1H560J		C, 56P	C4	1	C91-0457-05		C, 0.022	C8,11,12,13 16	5
CE04W1A470M		E, 47 10V	C17,28,67,72 81	5	E40-0373-05		Mini connector 3P	J7,10	2
CE04W1C100M		E, 10 16V	C55,82	2	E40-0473-05		Mini connector 4P	J6	1
CE04W1H010M		E, 1 50V	C20,22,57	3	E40-0573-05		Mini connector 5P	J3,9	2
CE04W1HR47M		E, 0.47 50V	C60	1	E40-0773-05		Mini connector 7P	J5	1
CK45B1H102K		C, 0.001	C3,5,8,25,29 32,36,38,39 42,59,66,70 71,74,76,77 80	18	E40-0973-05		Mini connector 9P	J4,8	2
CK45B1H471K		C, 470P	C15,40,43,48	4	L78-0003-05		Ceramic oscillator (3.58MHz) K,M	X1	1
CQ92M1H223K		ML, 0.022	C21,24	2	R12-2411-05		Trim pot (5kΩ) K,M	VR2	1
CQ92M1H683K		ML, 0.068	C52	1	R12-7406-05	N	Trim pot (500kΩ)	VR1	1
CS15E1C2R2M		T, 2.2 16V	C23	1	R90-0515-05		Resistor block (10kΩ × 4)	R13	1
CS15E1C4R7M		T, 4.7 16V	C31	1	R90-0526-05		Resistor block (27kΩ × 4)	R18	1
CS15E1E010M		T, 1 25V	C54,58	2	R90-0557-05	N	Resistor block (27kΩ × 8)	R19	1
CS15E1VOR1M		T, 0.1 35V	C56	2	R90-0558-05	N	Resistor block (27kΩ × 10)	R11	1
C90-0804-05		Cap. 0.001	C75,78	2	S59-0415-05	N	Key board switch (Reset SW)	S1	1
C91-0105-05		C, 0.0047	C16,50,51	3					
C91-0131-05		C, 0.01	C7, 9,19,41 49	5					
C91-0457-05		C, 0.022	C18,53	2					
E04-0154-05		Coax. connector DO		1	RX Unit (X55-1330-10, 61,51) 10: K, M 51: T 61: W				
E40-0573-05		Mini connector, 5P		1	CC45CH1H020C		C, 2P ± 0.25P	C14	1
E40-0973-05		Mini connector, 9P		1	CC45CH1H030C		C, 3P ± 0.25P	C3	1
					CC45CH1H050C		C, 5P ± 0.25P	C17	1
					CC45CH1HOR5C		C, 0.5P ± 0.25P	C12	1
					CC45CH1H150J		C, 15P	C11	1

PARTS LIST

Part No.	Re- marks	Description	Ref. No.	Q'ty	Part No.	Re- marks	Description	Ref. No.	Q'ty
CC45CH1H220J		C, 22P	C4	1	G09-0407-14		Gnd spring		1
CC45CH1H330J		C, 33P	C1,13	2	L15-0016-05		Choke coil (Low frequency)	L14	1
CC45RH1H100D		C, 10P ±0.5P	C5	1	L30-0005-05		IFT 10.7MHz	L5,6	2
CC45RH1H120J		C, 12P	C2	1	L30-0199-05		IFT 455kHz	L9	1
CC45SL1H101J		C, 100P	C18,20,71	3	L30-0503-05		IFT 455kHz	L7,10	2
CC45SL1H121J		C, 120P	C51	1	L31-0267-05		ANT coil	L1,2	2
CC45SL1H221J		C, 220P	C23,90	2	L34-0683-05		Tuning coil	L4	1
CC45SL1H331J		C, 330P	C86	1	L40-1021-03		Ferri-inductor, 1mH	L12	1
CC45SL1H390J		C, 39P	C88	1	L40-1021-25		Ferri-inductor, 1mH	L13	1
CC45SL1H561J		C, 560P	C85	1	L71-0216-05		MCF, 10.695MHz	XF1	1
CE04W1A101M		E, 100 10V	C70,75	2	L72-0315-05		Ceramic filter, CFW455F	CF1	1
CE04W1A470M		E, 47 10V	C41,65,74,91 97	5	L77-0858-05		Crystal, 10.24MHz	L8	1
CE04W1E220M		E, 22 25V	C64	1	L79-0446-05		Ceramic disc, CFY455S	L11	1
CE04W1H010M		E, 1 50V	C64,201,202	3	L79-0468-05		Helical block	T,W L3	1
CE04W1H100M		E, 10 50V	C44,61,67,84 89	5	L79-0483-05		Helical block	K,M L3	1
CE04W1HR47M		E, 0.47 50V	C55,56	2	N30-3004-46		Round screw		2
CE04W1H4R7M		E, 4.7 50V	C78,79,80,82, 83	5	R12-1426-05	N	Trim. pot. 2kΩ	VR2	1
CK45B1H102K		C, 0.001	C78,79,80,82 83,203	6	R12-3436-05		Trim. pot. 10kΩ	VR1,4	2
CK45B1H222K		C, 0.0022	C36	1	R12-3439-05	N	Trim. pot. 20kΩ	T,W VR5	1
CK45B1H471K		C, 470P	C6,7,8,9,10 15,26,77,100	9	R12-4412-05		Trim. pot. 50kΩ	VR3	1
CK45B1H681K		C, 680P	C69	1	R92-0150-05		Jumper wire	K,M T W	22 27 28
CK45F1H103Z		C, 0.01	C49,92,93,95 98,99	6	Display assy Unit (X60-1230-10)				
CQ92M1H102K		ML, 0.001	C49,92,93,95 98,99,205	7	B10-0652-04	N	Front glass		1
CQ92M1H103K		ML, 0.01	C42,45	2		N	LCD plate		1
CQ92M1H122K		ML, 0.0012	C30	1		N	Connector with lead line		1
CQ92M1H152K		ML, 0.0015	C72	1		N	Shadow mask		2
CQ92M1H222K		ML, 0.0022	C87	1	J21-2775-04	N	Mounting plate		1
CQ92M1H223K		ML, 0.0022	C53	1	N89-2005-46		Tap tight screw		7
CQ92M1H333K		ML, 0.033	C62,63,66 C52,68	3	S59-0412-05	N	Key board assy		1
CQ92M1H472K		ML, 0.0047	C50,81	2	X54-1700-10	N	Display unit		1
CQ92M1H473K		ML, 0.047	C46,47,52	2	X54-1730-10	N	LCD unit		1
CS15E1A100M		T, 10 10V	C60	1	Display Unit (X54-1700-10)				
CS15E1A220M		T, 22 10V	C60,207	2	B30-0827-05	N	Lamp		1
CS15E1A3R3M		T, 3.3 10V	C206	1	B30-0828-05		Lamp with cap		2
CS15E1A4R7M		T, 4.7 10V	C48	1	CK45B1H102K		C, 0.001	C1	1
CS15E1VR47M		T, 0.47 35V	C54	1	CK45F1H103Z		C, 0.01		1
C90-0820-05		E, 470 16V	C58,59	2	CS15E1VR47M		T, 0.47 35V	C2	1
C90-0834-05		C, 0.15	C76,94	2	C90-0560-05		Inline block 0.022 x 5	C5	1
C91-0131-05		C, 0.01	C73	1	C91-0457-05		C, 0.022	C3,4	2
C91-0456-05		C, 0.047	C25,35	2	E40-0473-05		Mini connector 4P	J24	1
C91-0457-05		C, 0.022	C27,28,29,32, 33,37,38,39, 40	9	E40-0573-05		Mini connector 5P	J23	1
E40-0273-05		Mini connector 2P	C16,19,21,43 96	5	E40-0673-05		Mini connector 6P	J25	1
E40-0373-05		Mini connector 3P	J11,12,19	4	RC05GF2H100J		Resistor 10Ω, 1/2W	R13,14	2
E40-0473-05		Mini connector 4P	J11,12,19,20	5	LCD Unit (X54-1730-10)				
E40-0673-05		Mini connector 6P	J13,18	2	CS15E1V0R1M		T, 0.1 35V	C101	1
E40-0973-05		Mini connector 9P	J14	1	E40-0573-05		Mini connector, 5P	J22	1
E40-1073-05		Mini connector 10P	J17	1					
			J16	1					
			J15	1					

PC BOARD VIEWS

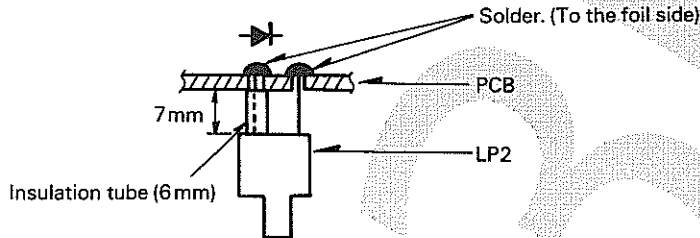
SWITCH UNIT (X41 - 1460 - 10,61,51) Component Side View



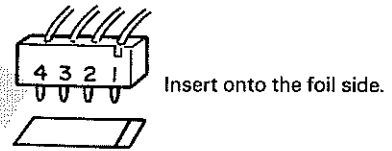
D1 ~ 4,5 (K, M), 6: IS1555

J31: W, T only

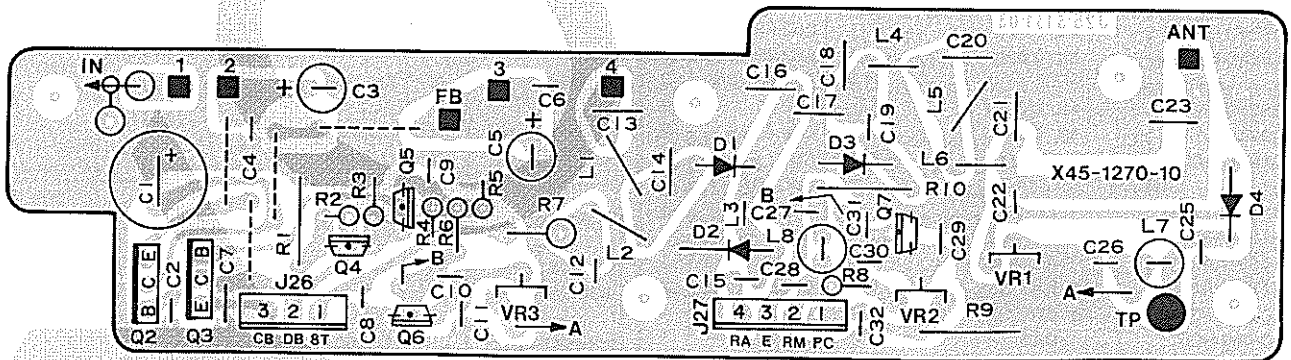
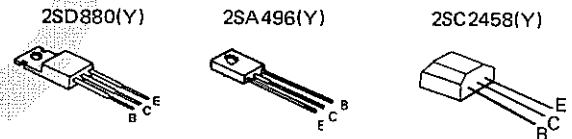
1. Installation of D7 (Use a jig.)



2. Installation of J28, J29 and J30

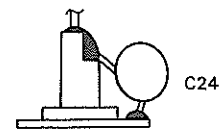
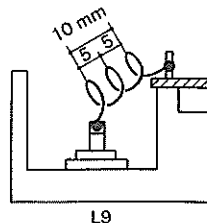
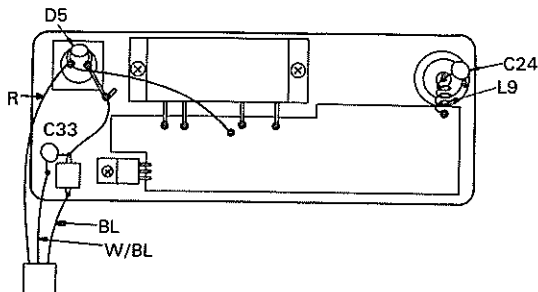


FINAL UNIT (X45 - 1270 - 10,11) Component Side View

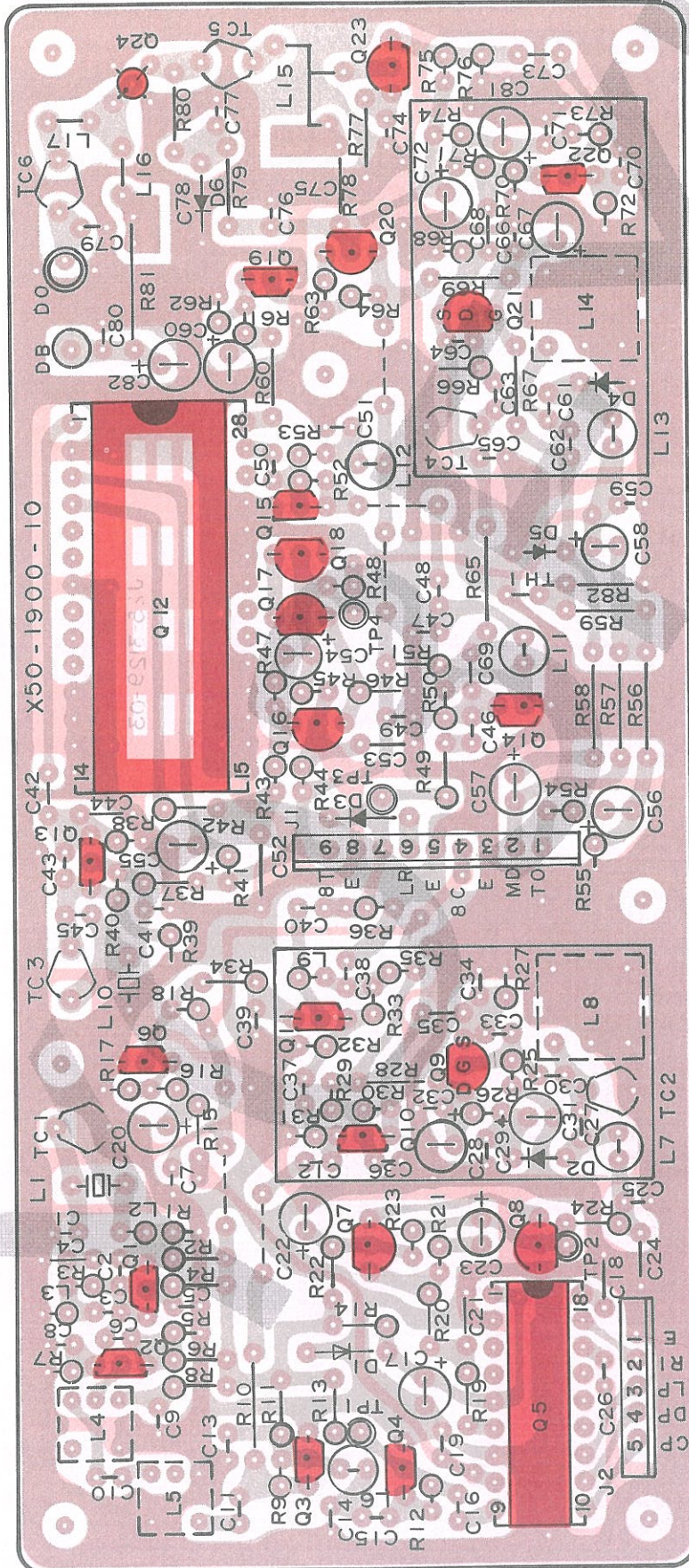


- Q1: M57726(TR-7950), M57733(TR-7930)
- Q2: 2SD880(Y), Q3: 2SA496(Y)
- Q4~7: 2SC2458(Y)
- D1: UM9401 D2: MI402(TR-7950), MI303(TR-7930) D3,4: 1S1587
- D5: U15B

1. Apply heat sinker to the power module and heat sink.
2. Tighten screw Q2, then others, to fix PCB.
3. Connect L9 and C24 as short as possible.
4. Expand the distance between coils L9 to about 5 mm.

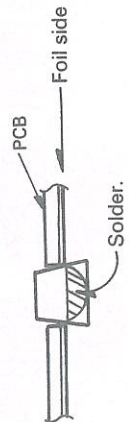


PLL UNIT (X50-1900-10, 11) Component Side View

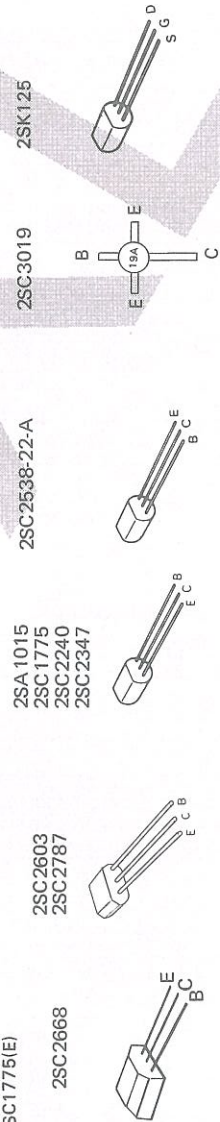


- Q1,2,13: 2SC2787(L) Q3,4,10,11,14,15,22: 2SC2668(Y)
- Q5: MC145155P Q6,19:2SC2603(D,E)
- Q7,8: 2SC2240(G,R) Q9:2SK125 Q12: MC145151P Q16~18: 2SC1775(E)
- Q20: 2SA1015(Y) Q21:2SK125 Q22:2SC2668(Y) Q23:2SC2347
- Q24: 2SC2538(T,R-7930), 2SC3019(T,R-7950)
- D1: XZ-055 D2,5-1S2208 D3,6: 1S1555 D4: 1SV50

1. Installation of C75 and C78.

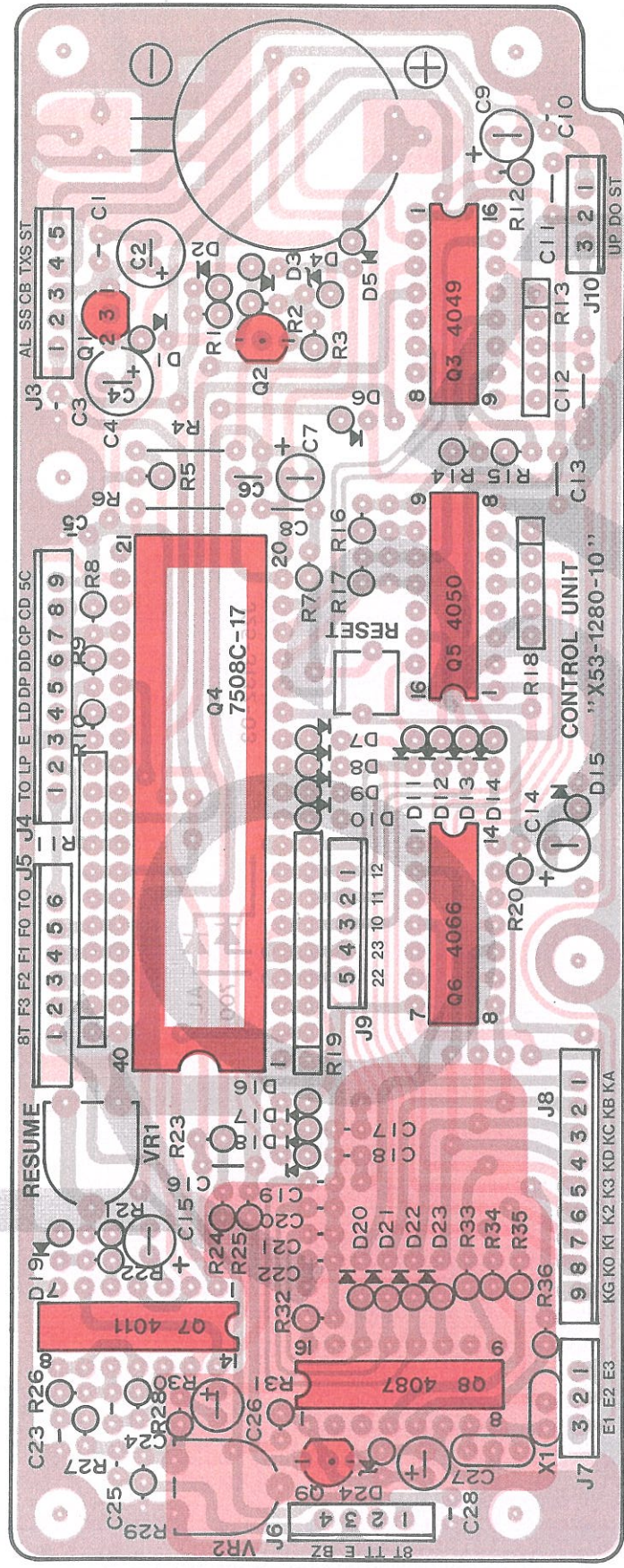


2. Incline C30 to L8, and L7 to shield case.



A B C D E F

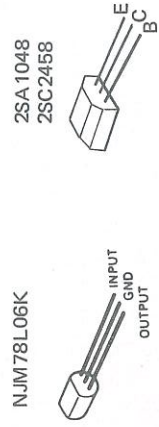
CONTROL UNIT (X53 - 1280 - 10,61) Component Side View



PC BOARD VIEW

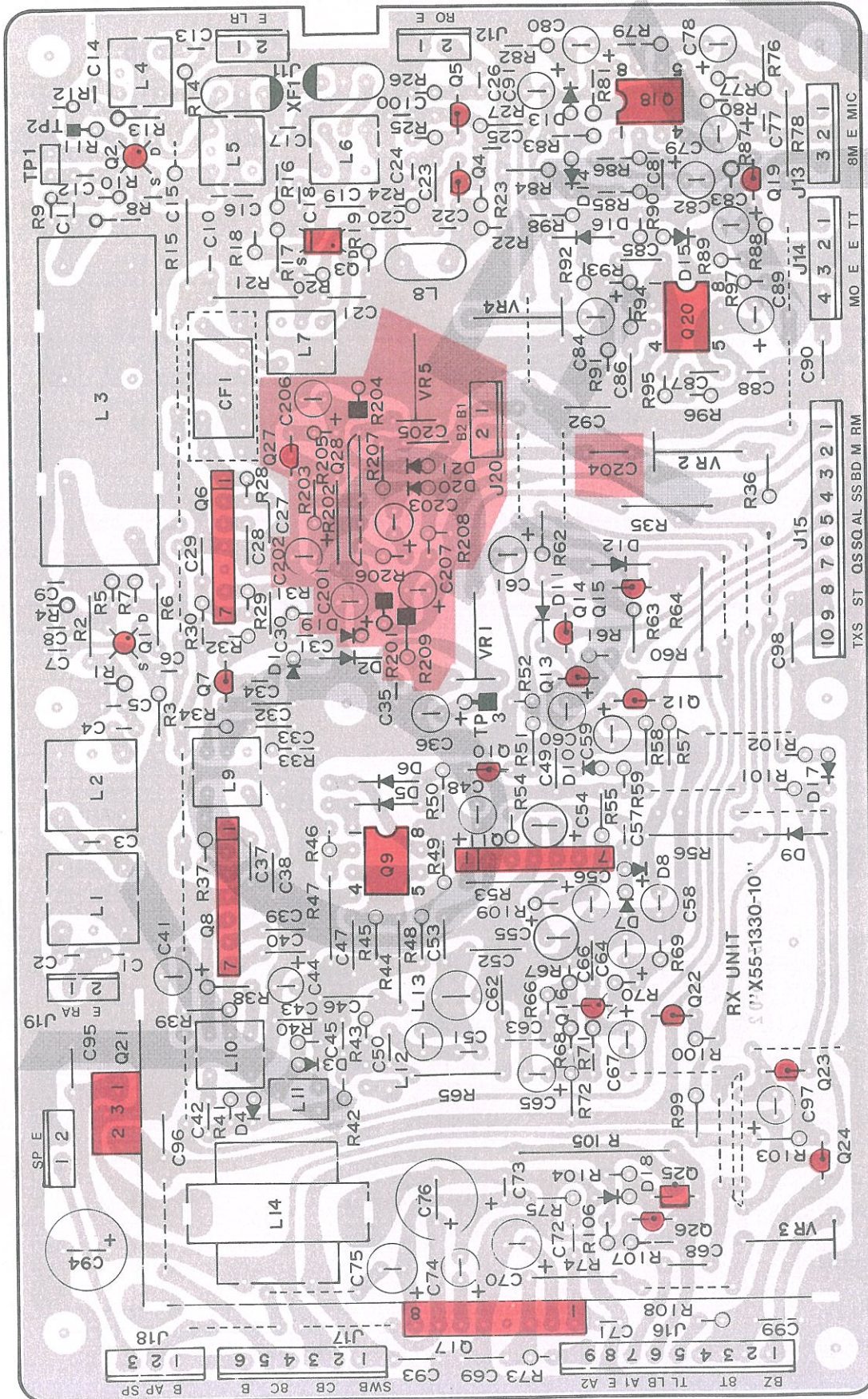
- Q1: NJM78L06K Q2:2SA1048(Y) Q3: TC4049BP Q4: μPD7508C-017
- Q5: TC4050BP Q6:MC1466BCP Q7: TC4011BP Q8(K,M): LR4087
- Q9(K,M)- 2SC2458
- D1 ~ 3.5 ~ 15, 16(W, T), 17(W, T), 19, 20 ~ 23(K, M):IS1555

:K,M only



PC BOARD VIEW

RX UNIT (X55 - 1330 - 10,61,51) Component Side View



D21
C206,207 } T only
R208,209

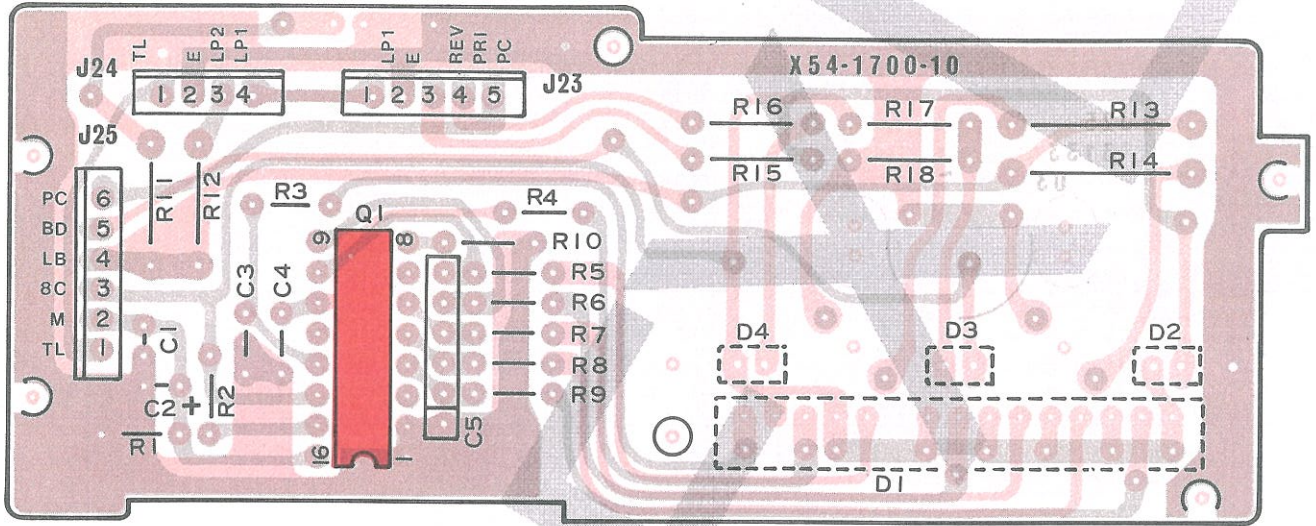
MO E E TT 9M E MIC
10 9 8 7 6 5 4 3 2 1

TXS ST QSSQAL SSB D M RM
10 9 8 7 6 5 4 3 2 1

- Q1,2: 3SK74(L) Q3:3SK73(GR) Q4,5,7: 2SC2787(L)
 - Q6: TA7302P Q8:μPC577H Q9,18,20:μPC4558C
 - Q10,15,23,26,27(W,T): 2SC2458(Y) Q11: μPC592H2 Q12 ~ 14: 2SC2458(BL)
 - Q16: 2SC2240(GR) Q17: MB3712 Q21: μPC78M08H Q22,24: 2SC1959(Y)
 - Q25: 2SC496(Y) Q28(W,T): AFG05F1750A2
 - D1,2,5~17,20(W,T), 21(T): 1S1555 D3,4: IN60 D18:WZ-120 D19: XZ-060(W,T)
1. Installation of Q17 to shield plate.
2. Install XF1s so that the top faces inward.
3. Installation of Q21 to shield plate
-
-
- Apply heat sinker.
- Apply heat sinker.
- μPC78M08H
 - 2SC496
 - 2SC1959
 - 2SC2240
 - μPC577H
 - μPC592H2
 - TA7302P
 - 2SC2787
 - 2SC2458
 - 3SK73
 - 3SK74
 - AFG05F1750A2
 - MB3712
 - 2SC2458(BL)
 - Q21

DISPLAY ASSY UNIT (X60-1230-10) PC BOARD VIEWS

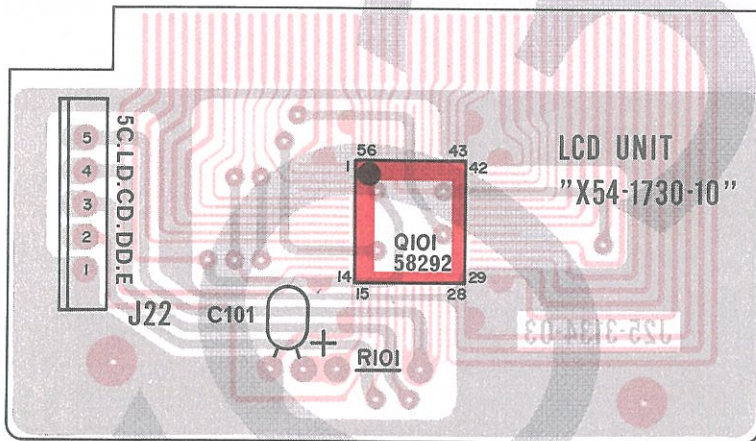
DISPLAY UNIT (X54 - 1700 - 10) Component Side View



Q1: TA7612AP
D1: GL107S12 D2, 4: GL9HY24 D3: PY5532K

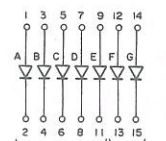
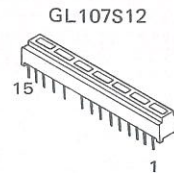
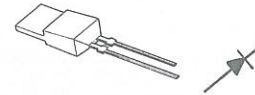
Attach D1, D2, D3 and D4 to the foil side and solder them using a jig.

LCD UNIT (X54 - 1730 - 10) Component Side View



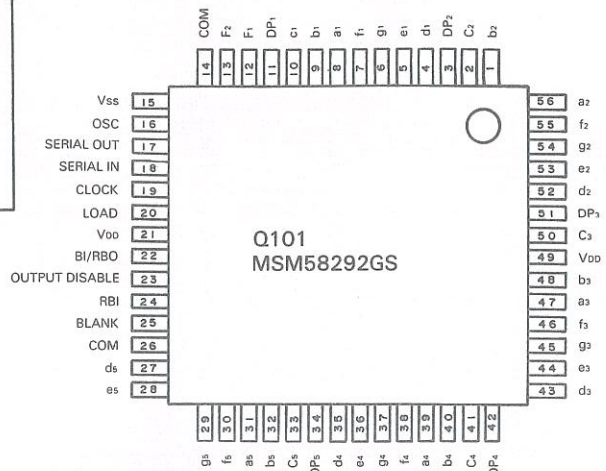
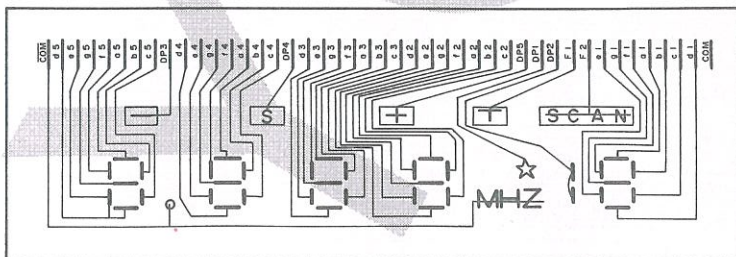
Q101 : MSM58292GS

GL9HY24

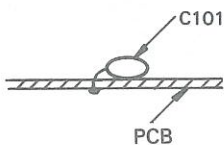


Yellow-green x 5 Red x 2

No.	FUNCTION
1	Dot A Anode
2	Dot A Cathode
3	Dot B Anode
4	Dot B Cathode
5	Dot C Anode
6	Dot C Cathode
7	Dot D Anode
8	Dot D Cathode
9	Dot E Anode
10	NO PIN
11	Dot E Cathode
12	Dot F Anode
13	Dot F Cathode
14	Dot G Anode
15	Dot G Cathode



1. Install C101 as shown below.



2. Install Q101 with mark aligned.

DISASSEMBLY

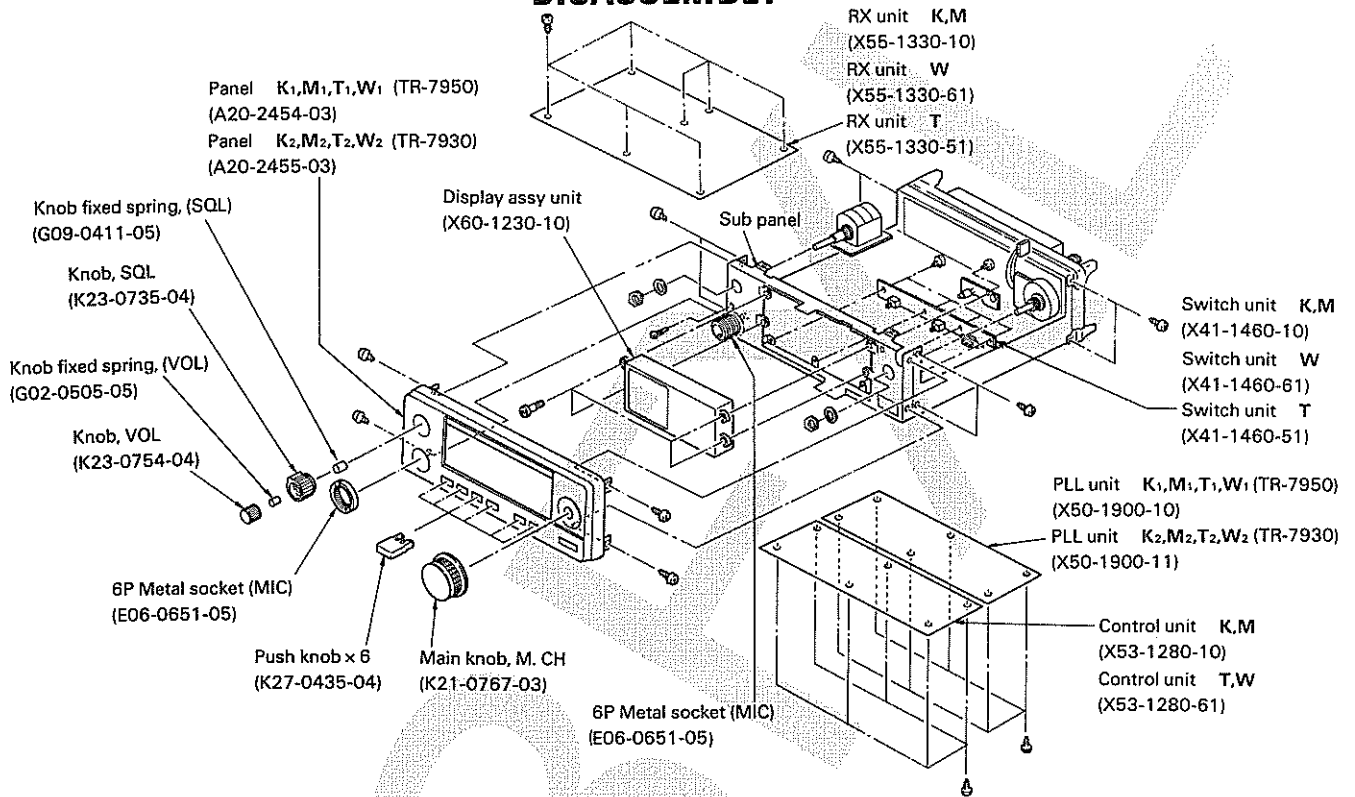


Fig 13. Front panel

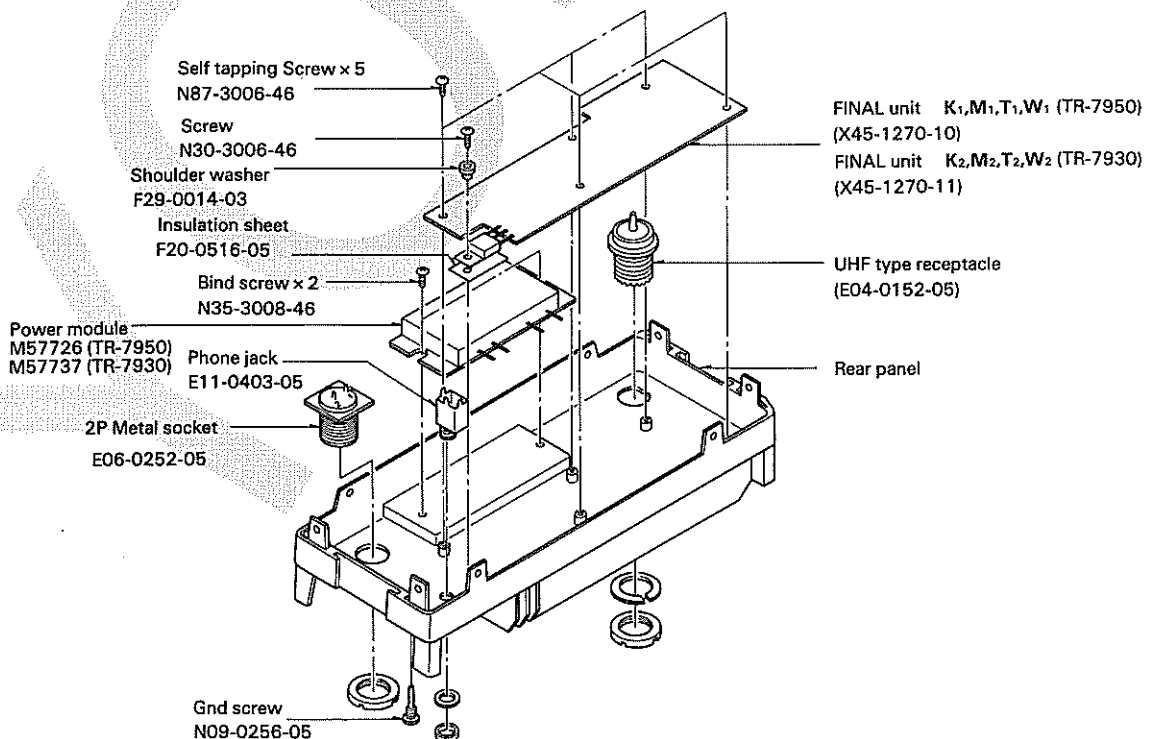
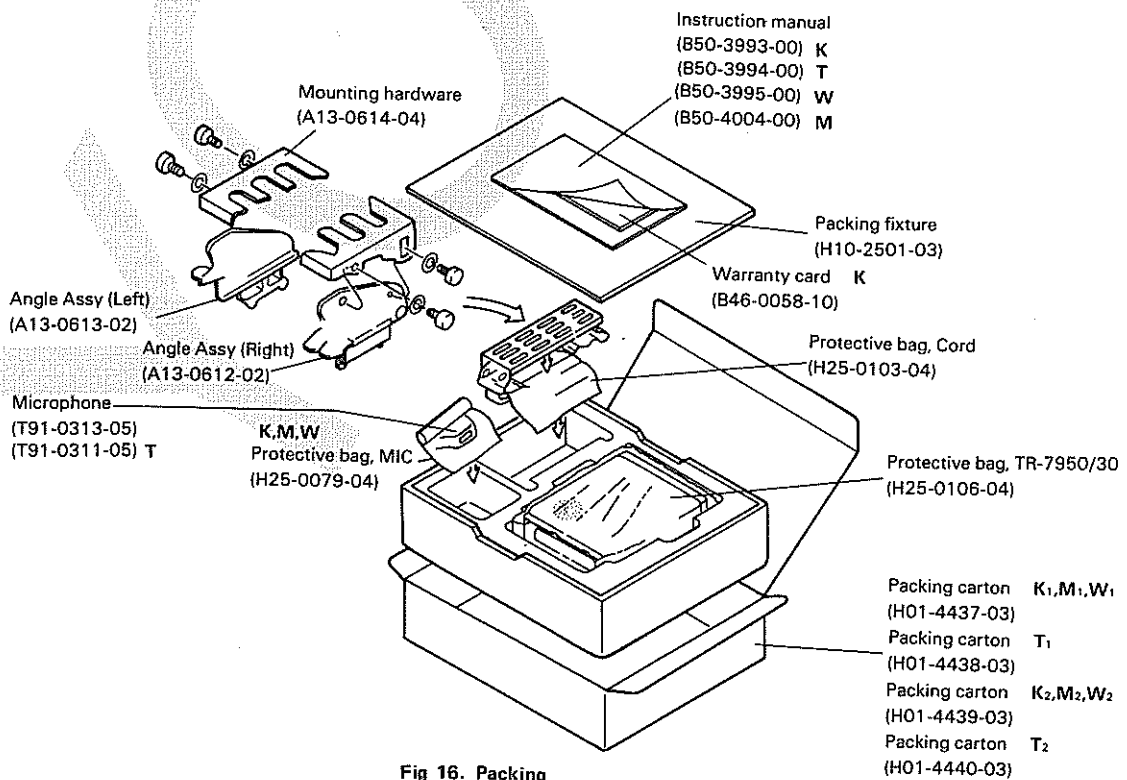
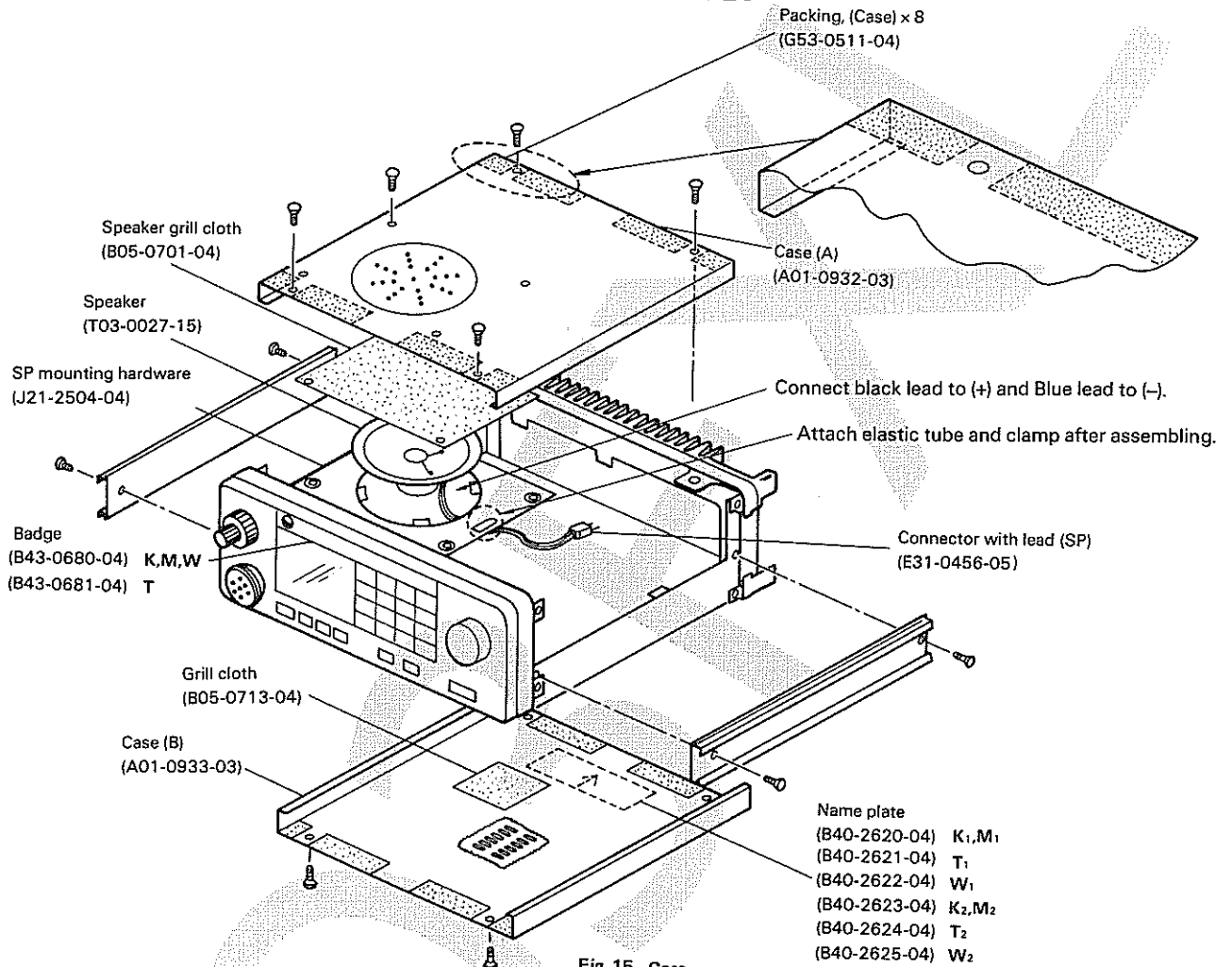


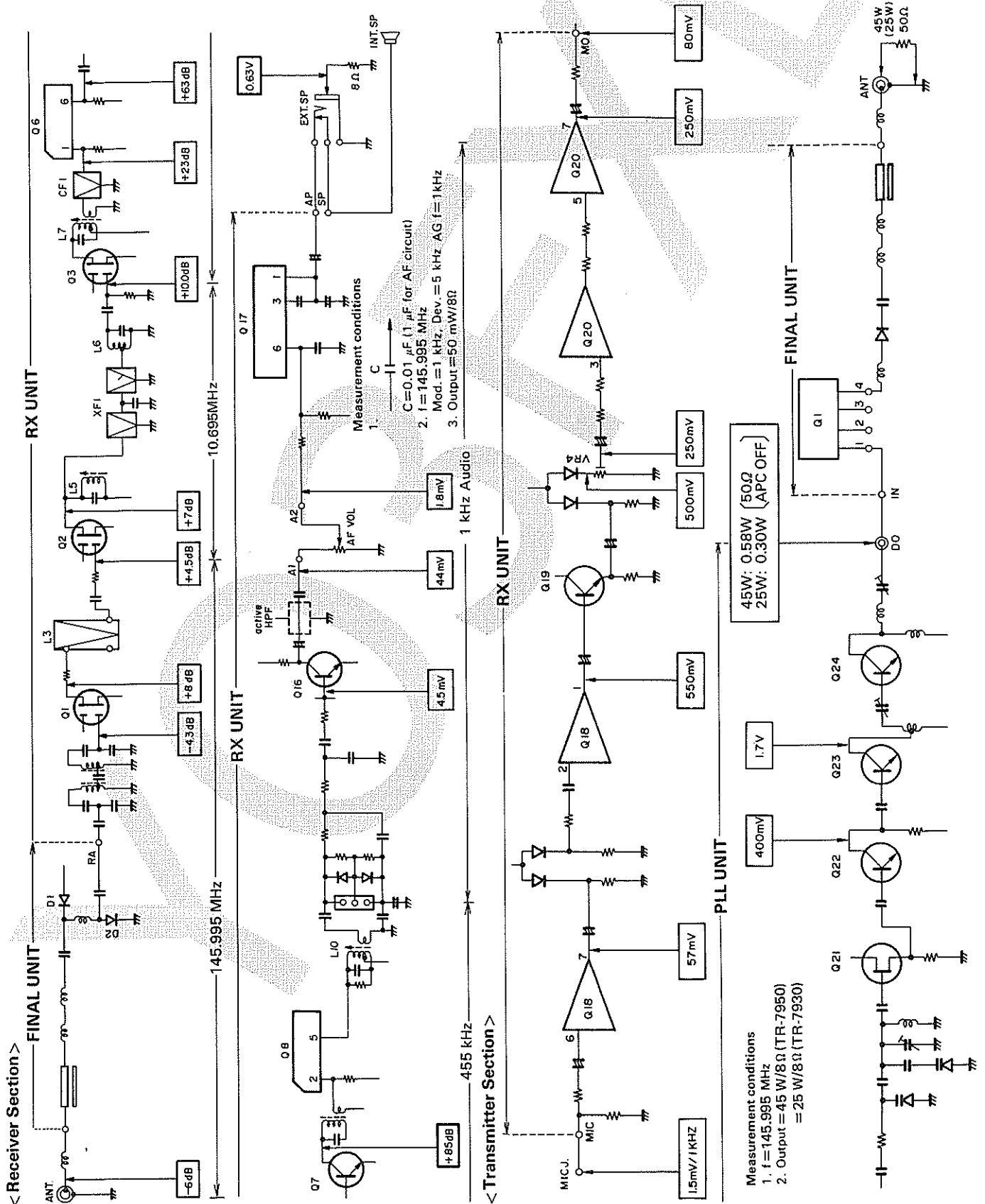
Fig 14. Rear panel

TR-7950/TR-7930

DISASSEMBLY



LEVEL DIAGRAM



TR-7950/TR-7930

ADJUSTMENTS

< Test Equipment >

1. Tester
 - Input Sufficient
 2. RF VTVM (RF V.M.)
 - Input impedance 1 MΩ and less than 2 pF
 - Voltage range FS = 10 mV to 300V
 - Frequency range 150 MHz or greater
 3. Frequency counter (F count)
 - Minimum input voltage 50 mV
 - Frequency range 150 MHz or greater
 4. DC power supply
 - Voltage 10V to 17V variable
 - Current 8A min
 5. RF Power Meter
 - Dissipation 50W
 - Impedance 50Ω
 - Frequency range 144 MHz
 6. AF VTVM (AF V.M.)
 - Input impedance 1 MΩ or greater
 - Voltage range FS = 1 mV to 30V
 - Frequency range 50 Hz to 10 kHz
 7. AF Generator (AG)
 - Frequency range 100 Hz to 10 kHz
 - Output 0.5 mV to 1V
 8. Linear detector
 - Frequency range 144 MHz
 9. Directional coupler
 10. Oscilloscope
 - With horizontal input and high sensitivity
 11. Standard signal generator (SSG)
 - Frequency range 144 ~ 149 MHz
 - Modulation amplitude and frequency modulation
 - Output -20 dB ~ 100 dB
 12. AF Dummy load
 - 8Ω, 5W (approx)
 13. Sweep generator
 - Frequency range 144 ~ 149 MHz
- 13.8 V Power
 Low power 7W 3.5 amp
 High power 50W 9 amp
 Receiver (no-SND) .4 amp

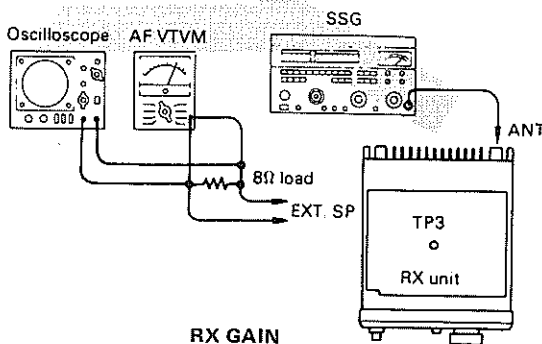


Fig 18.

< Preparation >

Unless otherwise specified, set the controls as follows

POWER/ VOL SW	ON
SEND/ REC (MIC)	REC
AF VOL	MIN
SQUELCH VOL	MIN
SELECT	KEY
SCAN	TO
HI/ LOW SW	HI
PRIORITY	
ALERT	OFF
OPER	OFF
TONE	OFF
REV	OFF

Notes:

- When adjusting the trimmers or coils, use a non-induced adjusting rod of bakelite, etc
- When adjusting the RX section never transmit to prevent SSG damage
- Connect MIC connector as shown in Fig. 17

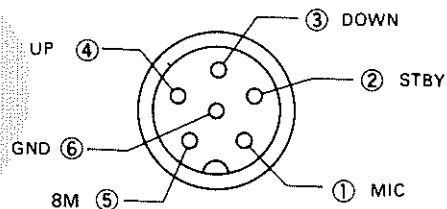


Fig 17. MIC terminals (view from front panel side)

- The output level of SSG is indicated as SSG's open circuit.

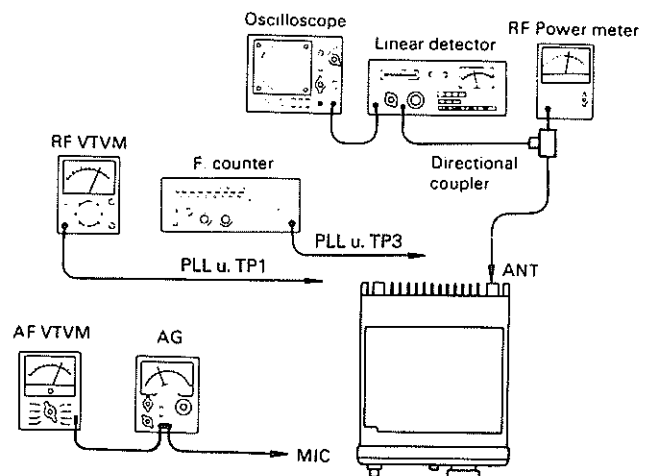
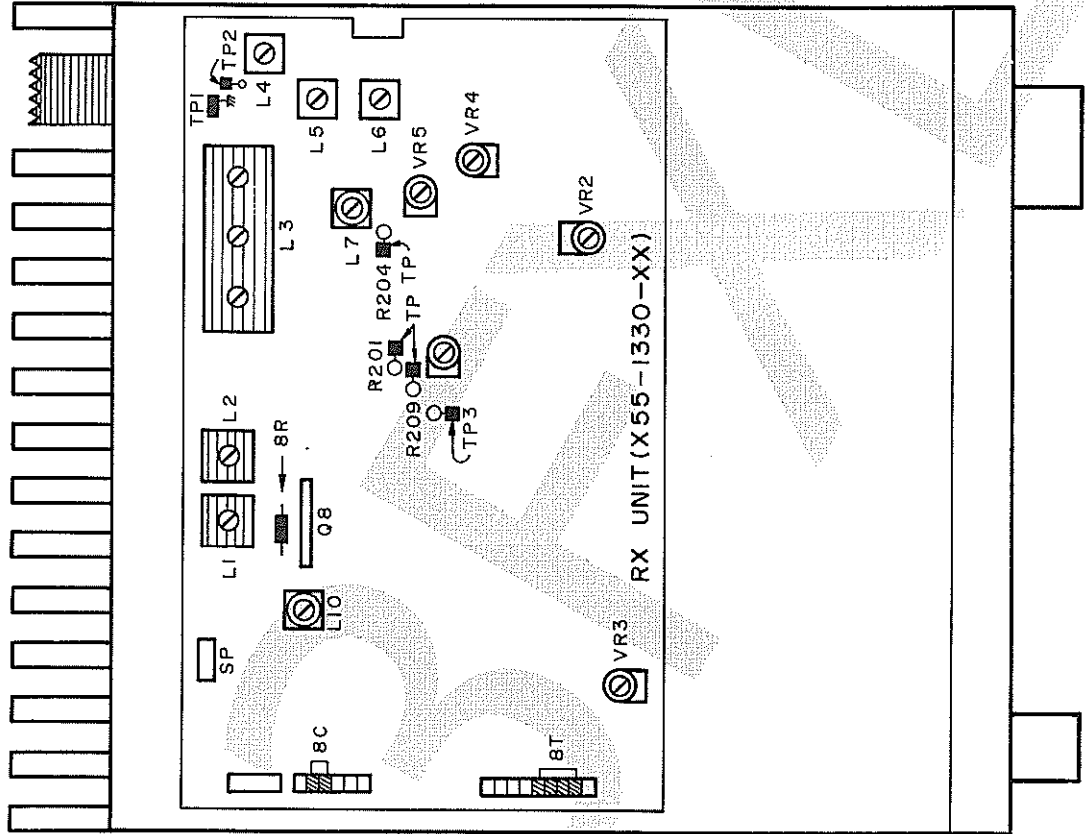


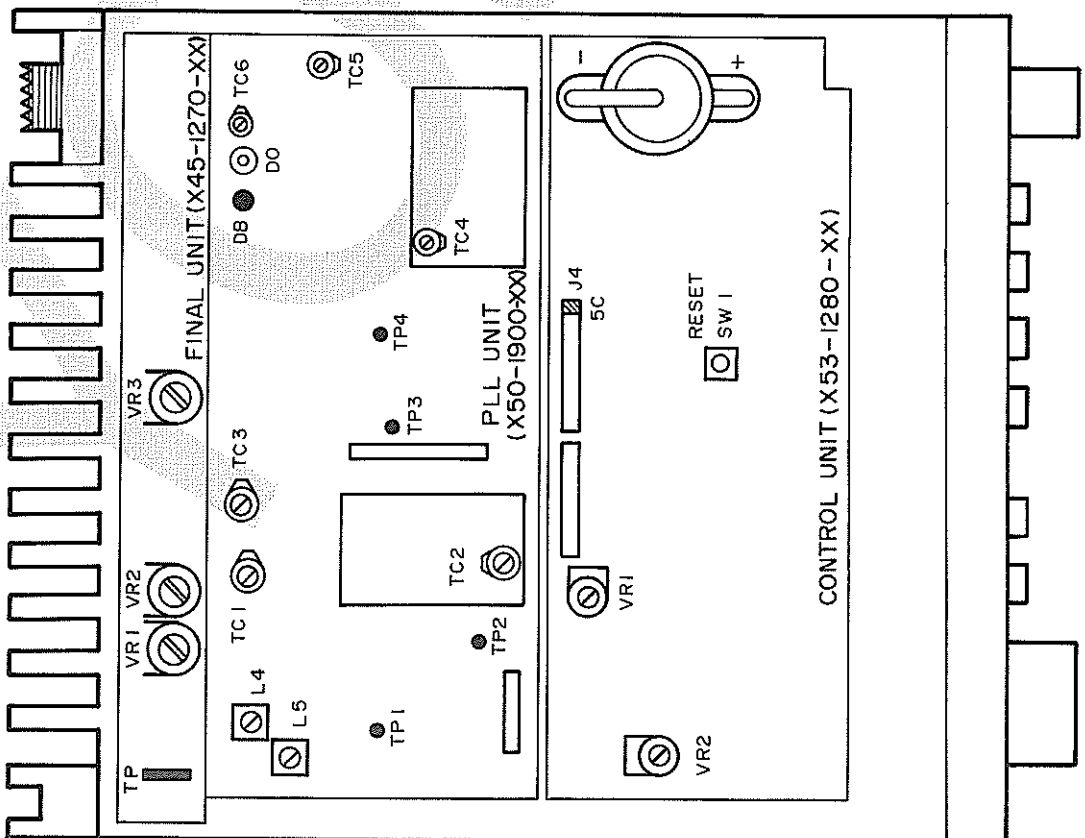
Fig 19. PLLU, DRIVE, Deviation

ADJUSTMENT POINT

TOP VIEW


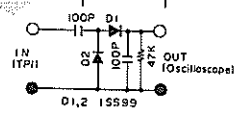
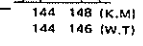


BOTTOM VIEW



TR-7950/TR-7930

ADJUSTMENT



















Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Voltage check	1) DC power supply: 13.8V Power SW: ON SQL control: MIN. (fully CCW)	DVM (Digital volt meter)	RX	8R				7.6 ~ 8.2V
				8C				7.7 ~ 8.3V
				8T				0.3V or less
	2) Transmit			8T				7.6 ~ 8.2V
				8R				0.1V or less
3) Receive			PLL	DB			7 ~ 13V	
			CON- TROL	5C				5.1 ~ 5.7V
2. Reset	1) Depress (CONTROL unit) SW1, RESET SW ON, 2 ~ 3 times.	Display						4,000
	2) SELECT: M. CH MEMORY: b							7,995 (K, M) 5,995 (W, T)
3. Lithium Backup Battery	1) Solder the Lithium Battery to the CONTROL unit when Power SW is ON.	DVM	CON- TROL	⊕				Do not short the Lithium Battery. 3V
4. "Beeper"	1) VOL: 12:00 SQL: 12:00 MIC: Connect and press the MIC UP or DOWN continuous- ly.	AF VTVM	Rear -Panel	SP	RX	VR3	0.5V	
5. PLL	1) Dial: 2.000 4.000 (W, T)	RF VTVM	PLL	TP1	PLL	L4, 5	MAX.	1.5V or more
		DC, VM		TP2		TC2	6.2V 5.2V (W, T)	± 0.1V
	2) Transmit			TP4		TC4	2.5V 3.5V (W, T)	± 0.1V
	3) Receive Dial: 5.000	f.counter		TP3		TC1	134.305 MHz	± 100 Hz
	4) Transmit			D0		TC3	145.000 MHz	
6. DRIVE	1) Dial: 6.600 5.995 (W, T) Transmit	Power -meter		D0		TC5, 6	MAX.	0.5W or more 0.2W or more (K2, W2, T2, M2)
7. HELICAL	1) ANT: Sweep Gen. Output 10dB	Detector	RX	TP1	RX	L1, 2, 3	Adjust to obtain the waveform shown.	
		Oscillo- scope						
8. GAIN	1) Dial: 6.000 5.000 (W, T) ANT: SSG Output 10 dB μ Mod. 1 kHz, DEV/5 kHz f: 146 MHz 145 MHz (W, T)	DC VTVM	RX	TP3	RX	L4, 5 6, 7		0.8V or more
9. S-meter	1) Dial: 6.000 5.000 (W, T) ANT: SSG Output 15 dB μ Mod. 1 kHz, DEV/5 kHz	S-LED S-meter	Front- panel		RX	VR1	All LED's ON.	
		C,TUNING LED					LED should light.	
10. Discrimi- nator S/N	1) ANT: SSG Output 60 dB μ Mod. 1 kHz, DEV/5 kHz	AF VTVM Oscillo- scope	Rear -Panel	SP	RX	L10	MAX.	
	2) SSG Output: -6 dB μ						Check	S/N 20 dB or more
11. POWER	1) Final unit VR2, 3: MAX. (fully CW) 2) Dial: 6.600 5.000 (W, T) Connect coax. cable to D0 terminal in the PLL unit. Then transmit.	Ammeter in the DC supply			PLL	TC6	MAX.	











ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications
		Test equipment	Unit	Terminal	Unit	Part	Method	
12. PROTECTION null		DC Multi meter	FINAL	TP	FINAL	VR1	MIN.	0.5V or less
		Power -meter	Rear -Panel	ANT				
13. RF. LED						VR2	25W (TR-7950) 15W (TR-7930)	
		RF-LED	Front-Panel		RX	VR2	All RF-LED's should light.	
14. POWER SET-1 (TR-7950 only)	1) Final unit VR2: MAX. (CW) Increase the DC supply voltage until output becomes 55W. Dial: 8.995 5.995 (W1, T1)	Power -meter	Rear -Panel	ANT	FINAL	VR2	52W	
	2) Reset voltage to 13.8V						Check	4.5W or more (144 ~ 148MHz)
15. POWER SET-2 (TR-7930 only)	1) Dial: 8.995 5.995 (W2, T2)				FINAL	VR2	28W	
16. LOW POWER	1) HI/LOW SW: LOW	Power -meter		ANT			Check	3 ~ 7W (TR-7950) 2 ~ 6W (TR-7930)
		RF-LED						2 ~ 4 LED's should light.
17. PROTECTION Current	1) ANT: Open	DC Power Supply Ammeter			FINAL	VR3	4A (TR-7950) 2.5A (TR-7930)	
18. DEV	1) MIC 30 mV/1 kHz 2) MIC 3 mV/1 kHz	Linear -Detector			RX	VR4	4.6 kHz	± 100 Hz
19. SCAN	1) SCAN SW: TO Confirm (CONTROL unit) VR1 at 12 o'clock. SQL CONTROL: MIN (CCW) KEY Board: Press "SC"						Check	Should be SCAN 3 ~ 7 seconds
	2) KEY Board: Press "C"							
20. TONE (W1, W2 only)	1) Same as item 18. TONE SW: ON	f counter			RX	VR5	1,750 Hz	± 10 Hz
		Linear Detector					Check	2.5 kHz or more
21. TONE Burst (T1, T2 only)	1) Same as item 18. Connect a short jumper to R204, R201, R209 in the RX unit. Transmit	f counter			RX	VR5	1,750 Hz	± 10 Hz
		Linear -Detector					Check	2.5 kHz or more
		Monitor					Check	Should be monitored 0.5 ~ 1 second.
2) Disconnect short jumper Transmit TONE SW: ON						Check		
22. Touch TONE (K1, K2, M1, M2 only)	1) Transmit KEY Board: Press "S"	Linear -Detector			CONTROL	VR2	3 kHz	± 1 kHz

TR-7950/TR-7930

< Micro-processor operational check >

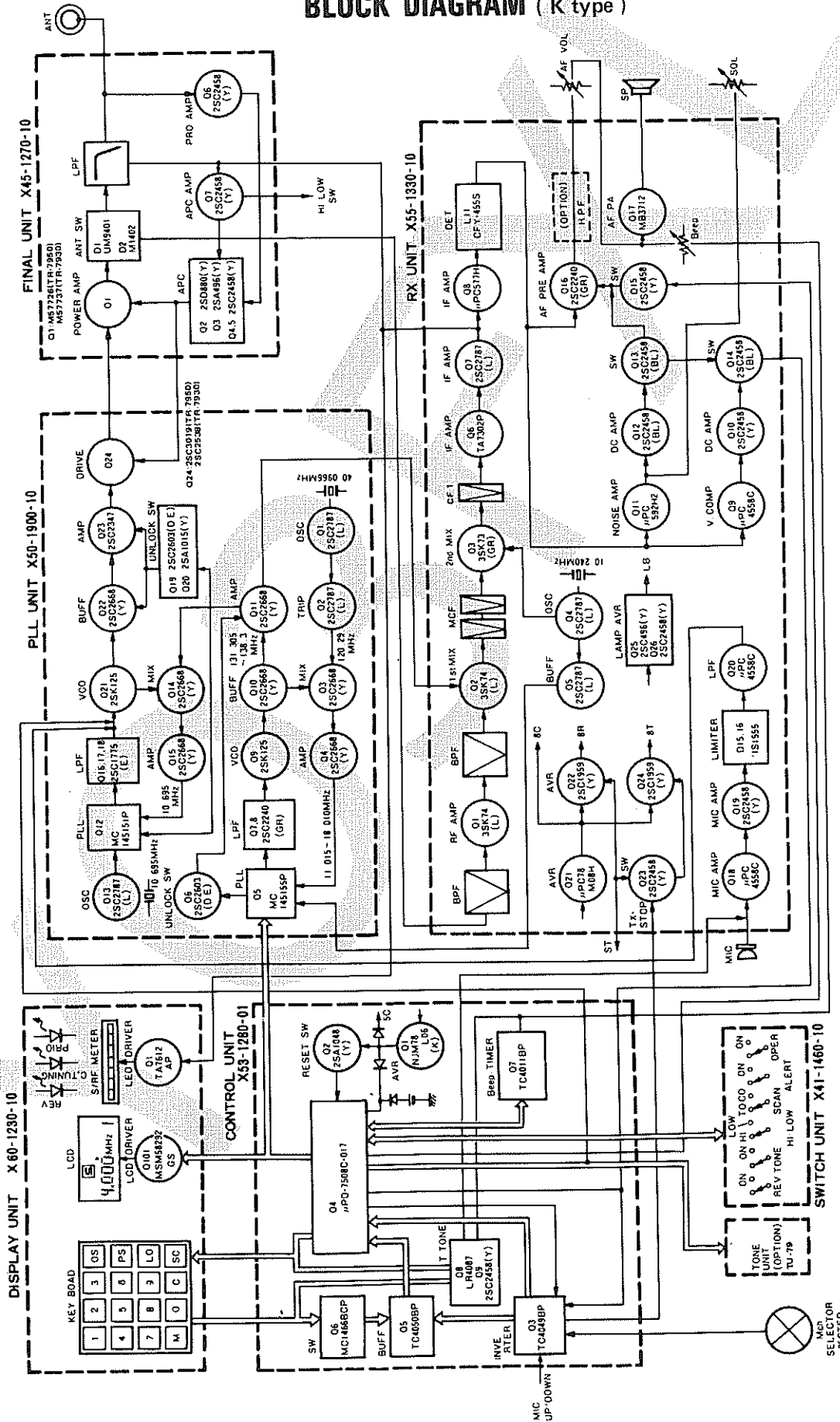
Item	Condition	Operation check	
1. KEY BOARD	1) SELECT SW: KEY SQL control: MIN (CCW) POWER SW: ON RESET SW: ON	 4.000 1	
	2) KEY 1, 9, 0, PS, LO 1, 2, 3, 6, 7, 8, 9, 0, PS, LO (W, T)	 4.000 1	
	3) KEY 2, 2, 2, 2, 2, 2, 2, 2, (W, T)	 2.220 1  4.220 1 (W, T)	Tone sounds 4 times.
	4) KEY 3, 3, 3, 3, 4, 3, 3, 3, (W, T)	 3.330 1  4.330 1 (W, T)	Tone sounds 4 times.
	5) KEY 4, 4, 4, 4,	 4.440 1	Tone sounds 4 times.
	6) KEY 5, 5, 5, 5,	 5.555 1	Tone sounds 4 times.
	7) KEY 6, 6, 6, 6, 5, 6, 6, 6, (W, T)	 6.665 1  5.665 1 (W, T)	Tone sounds 4 times.
	8) KEY 7, 7, 7, 7, 5, 7, 7, 7, (W, T)	 7.775 1  5.775 1 (W, T)	Tone sounds 4 times.
	9) KEY 8, 8, 8, 8, 5, 8, 8, 8, (W, T)	 8.885 1  5.885 1 (W, T)	Tone sounds 4 times.
	10) KEY 8, 9, 9, 9, 5, 9, 9, 9, (W, T)	 8.995 1  5.995 1 (W, T)	Tone sounds 4 times.
	11) KEY 5, 0, 0, 0	 5.000 1	Tone sounds 4 times.
	12) KEY OS	 5.000 1	The tone sounds.

Item	Condition	Operation check
	13) MEMORY Turn the dial to the right 1 step.	 5.000 2
	14) KEY M	 5.000 2 The tone sounds.
	15) Turn MEMORY Dial to the right. 2, 3, 4 ... 19, A, b, 1, 2	LCD MEMORY CH number should indicate. The tone sounds. b → 1 (or 1 → b)
2. SELECT SW	1) SELECT SW: M. CH	 5.000 2
	2) Turn MEMORY Dial left 1 step.	 4.000 1 The tone sounds.
	3) KEY LO	 4.000 * 1 The tone sounds.
3. REV & PRIORITY SW's	1) SELECT SW: KEY	 5.000 1
	2) REV SW: ON.	5.600 1
	3) REV SW: OFF OPER SW: ON	 4.000 * 1 REV-LED should extinguish. PRIORITY-LED should light.
4. ALERT	1) OPER SW: OFF SQL control: MIN (CCW) ALERT SW: ON VOL control: 9:00 ~ 10:00	PRIORITY-LED goes off. Noise should momentarily mute approx. 0.3 second, every 6 ~ 7 seconds.
5. PS KEY	1) Turn MEMORY Dial to CH b. KEY PS: ON	 5.000 b The tone sounds.
	2) ALERT SW: OFF OPER SW: ON	 7.995 b 5.995 b (W, T)
6. SCAN SW	1) OPER SW: OFF KEY "SC": ON	PRIORITY-LED goes off.  6 SCAN 4.000 b The tone sounds. The display should step up in 5 kHz steps approx every 6 seconds.
	2) KEY "C": ON	

< REFERENCE >

Japanese "SG"	American "SG"
-6 dB	0.25 μV
0 dB	0.5 μV
6 dB	1 μV
12 dB	2 μV
24 dB	8 μV
30 dB	15.8 μV
40 dB	50 μV
50 dB	158 μV
60 dB	500 μV
70 dB	1.58 mV
80 dB	5 mV
90 dB	15.8 mV
100 dB	50 mV
120 dB	0.5V

BLOCK DIAGRAM (K type)



TR-7950/TR-7930

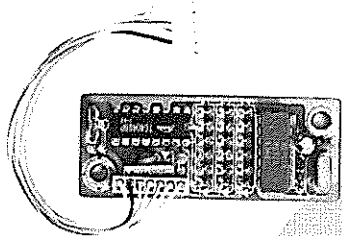
TU-79

TU-79 TONE UNIT (K, M only)

TU-79 SPECIFICATIONS

Oscillator frequency 1 MHz \pm 0.1%
 Output frequency 37 band within 67.0 Hz ~ 250.3 Hz

NOTE: To Control Unit J5



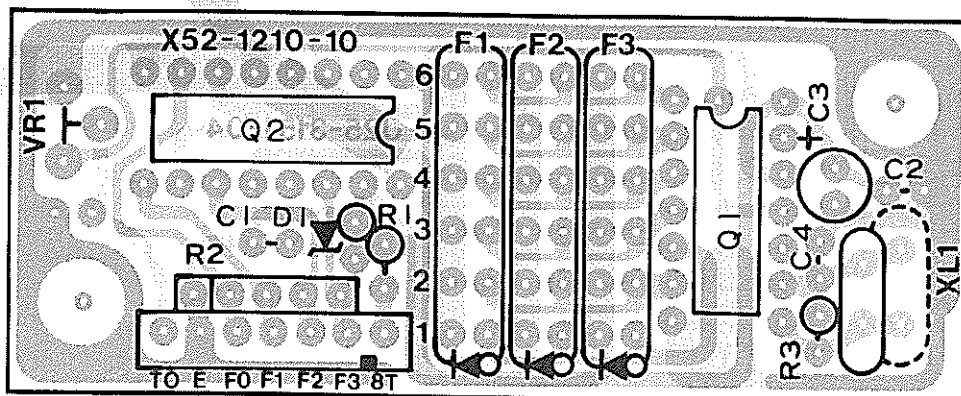
TU-79 PARTS LIST

N: New Parts

Part No.	Re- marks	Description	Ref. No.
GENERAL			
B50-4020-00	N	Instruction manual	
H01-4459-03	N	Packing carton	
H25-0029-04		Protective bag	
N87-3012-46		Self tapping screw x 2	
X52-1210-10	N	Tone unit	
TONE unit (X52-1210-10)			
CC45CH1H220J		C, 22P	C4
CE04W1A470M		E, 47	C3
C91-0131-05		C, 0.01	C1,2
E02-0110-05	N	IC socket 14P	
E31-2160-05	N	Connector with lead	
J31-0502-04		PC board collar	
J42-0404-05		PC board bush	
L77-0983-05		Crystal 1 MHz	XL1
MX315		IC	Q1
TC4049BP		IC	Q2
XZ-055		Zener Diode	D1
1S1555		Diode	D11 ~ 16 21 ~ 26 31 ~ 36
R12-1419-05		Trim. Pot. 3 k Ω	VR1
R90-0124-05		Resistor block 47 k Ω x 4	R2

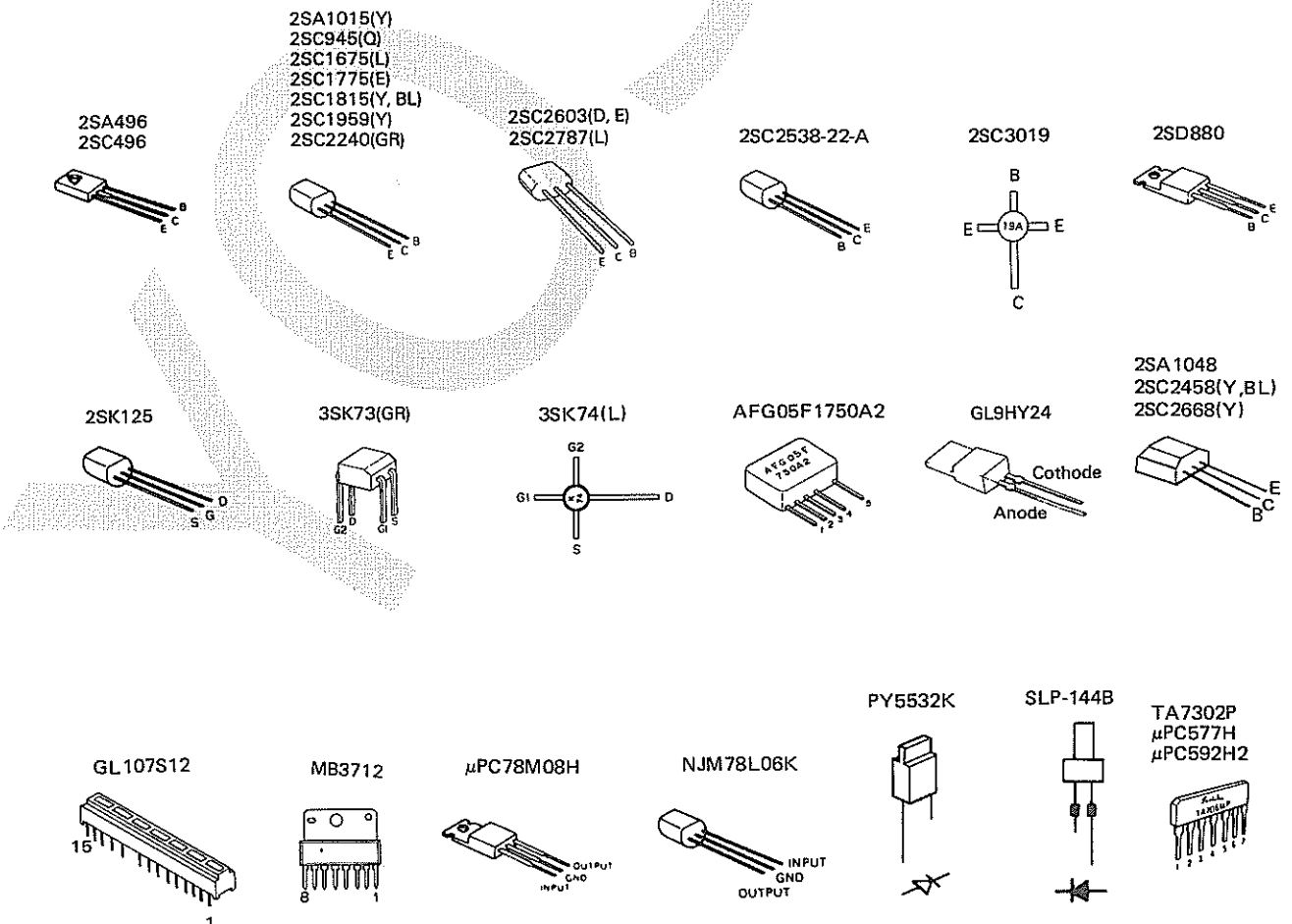
TU-79 PC BOARD (X52 - 1210 - 10)

Component side view



ABBREVIATION

AL	Alert	KB	Key Board "Row"	RM	RF Meter
AP	Audio Power Output	KC	Key Board "Row"	RO	Reference Oscillator Output
A1	Top of AF Control	KD	Key Board "Row"	SP	Speaker
A2	Arm of AF Control	KG	Key Board GND	SQ	Squelch Control
B	+13.8V	K1	Key Board "Column"	SS	SCAN Stop
BD	Busy Light	K2	Key Board "Column"	ST	Stand by Switch
BZ	Buzzer	K3	Key Board "Column"	SWB	Switched +B
B1	Tone Unit Switched +B W.T only	K4	Key Board "Column"	TL	TX Light
B2	Tone Unit +B W. T only	LB	Lamp +B	TO	Tone Output
CB	Common +B	LD	LCD IC Data	TT	Touch Tone Signal
CD	LCD IC Data	LP	PLL IC Data	TXS	TX Stop
CP	PLL IC Data	LP1	Rotary Lamp 1	UP	MIC Up Switch
DB	Drive +B	LP2	Rotary Lamp 2	5C	+5V Common
DD	LCD IC Data	LR	RX Local	8C	+8V Common
DO	MIC Down Switch	M	Meter	8T	+8V in TX
DP	PLL IC Data	MO	Modulator Out	10	μ -proc. port-1
E	GND	PC	Power Control	11	μ -proc. port-1
E1	Rotary Encoder	PR1	Priority Light	12	μ -proc. port-1
E2	Rotary Encoder	OS	Squelch Switch	22	μ -proc. port-2
E3	Rotary Encoder	RA	RX Antenna	23	μ -proc. port-2
FO ~ F3	Tone Select Code	REV	Reverse Light		
KA	Key Board "Row"	RI	Reference Oscillator Input		





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